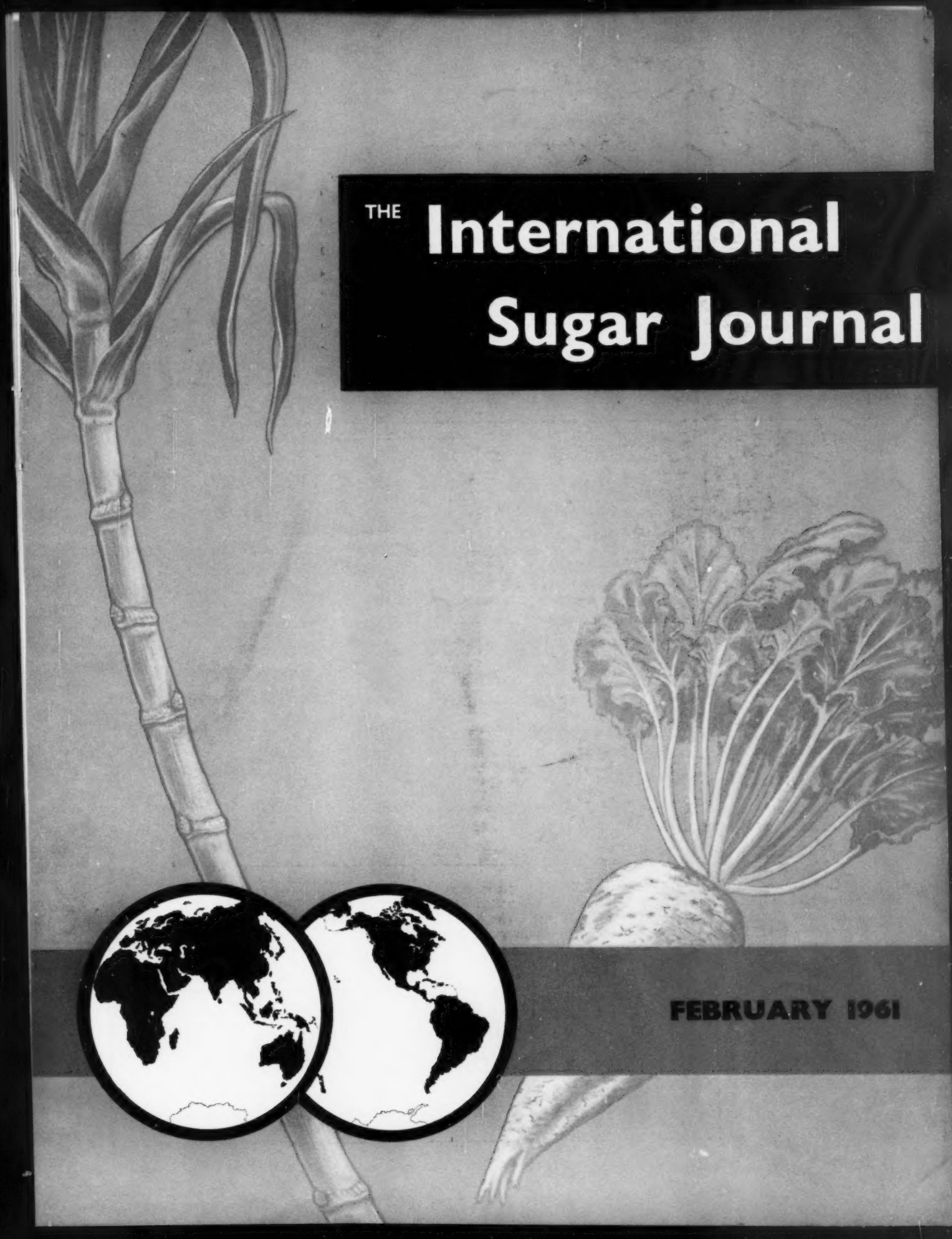

THE International Sugar Journal
FEBRUARY 1961

BLAIRS

COMPLETE

SUGAR

FACTORIES & REFINERIES

DISTILLERIES, ABSOLUTE ALCOHOL & CHEMICAL PLANTS

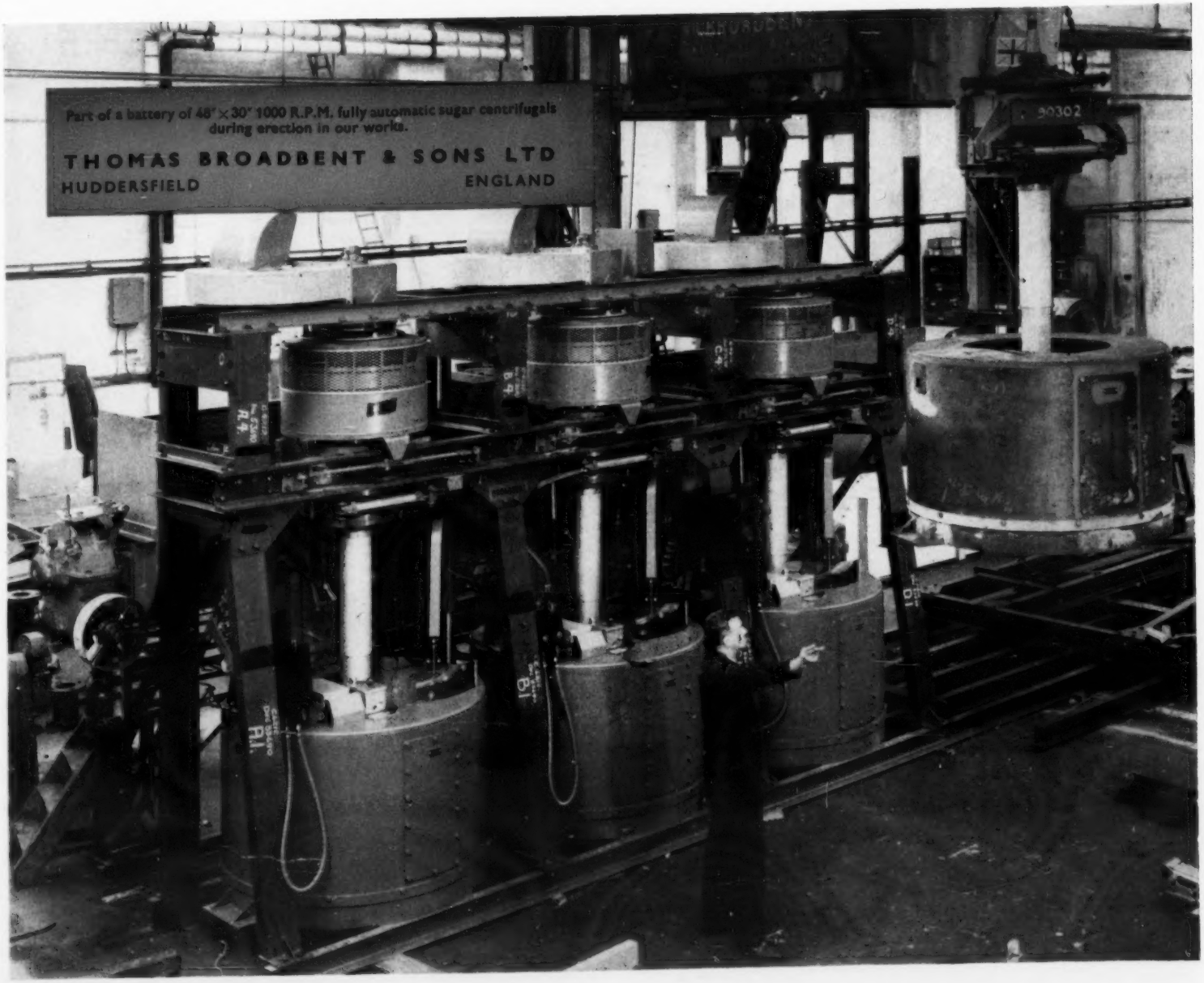
Our illustration shows a Quadruple Effet Evaporator with a total heating surface of 32,000 sq. ft. This Evaporator is supplied with special Entrainment Preventor and Barometric Condenser. The liquid level is adjusted by special control apparatus and a condensate draining system which gives a high thermal efficiency.

BLAIRS LIMITED

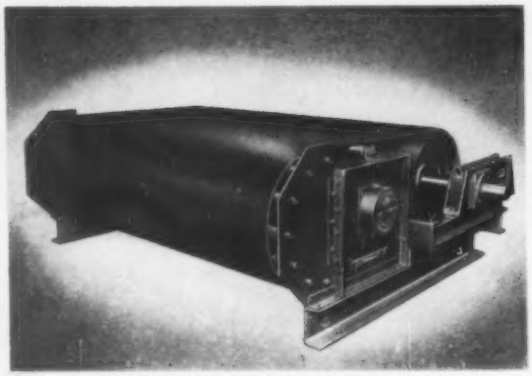
WOODVILLE STREET · GLASGOW S.W.1

Cables — "BLAZON GLASGOW"

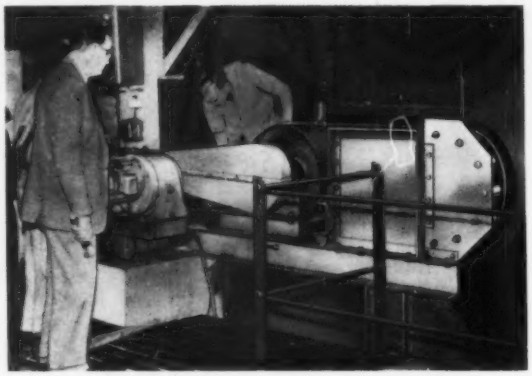
LONDON OFFICE — 38 GROSVENOR GARDENS, S.W.1 Cables — "MULTIVAP SOWEST LONDON"


Part of a battery of 48" × 30" 1000 R.P.M. fully automatic sugar centrifugals during erection in our works.
THOMAS BROADBENT & SONS LTD
HUDDERSFIELD
ENGLAND

MAGNETIC CONVEYOR HEAD



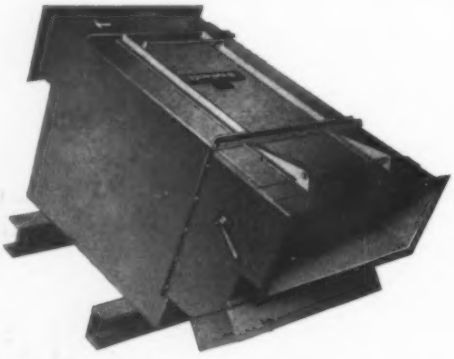
Boxmag patent MH. 2484. Conveyor Head built into an 84" wide short belt conveyor, photographed prior to despatch. The machine is designed for installation, as shown on the adjacent illustration.



Boxmag patent MH. 2484 installed in the chute between a sugar cane carrier and crusher, at a factory in Mauritius. It is designed to remove tramp metal automatically and continuously without an operator's attention. (write for leaflet 62/2).

MAGNETIC SEPARATORS PROTECT MACHINERY AND PRODUCTS

(Write for further details)



Boxmag Superflux Magnetic Chute for removal of ferrous contamination from refined sugar to decontaminate the product.

A Boxmag Unimajor block type Permanent Magnet. One of the many types of separators suitable for general applications in sugar factories. (write for details of full range).

BOXMAG

Telephone
Central 5391

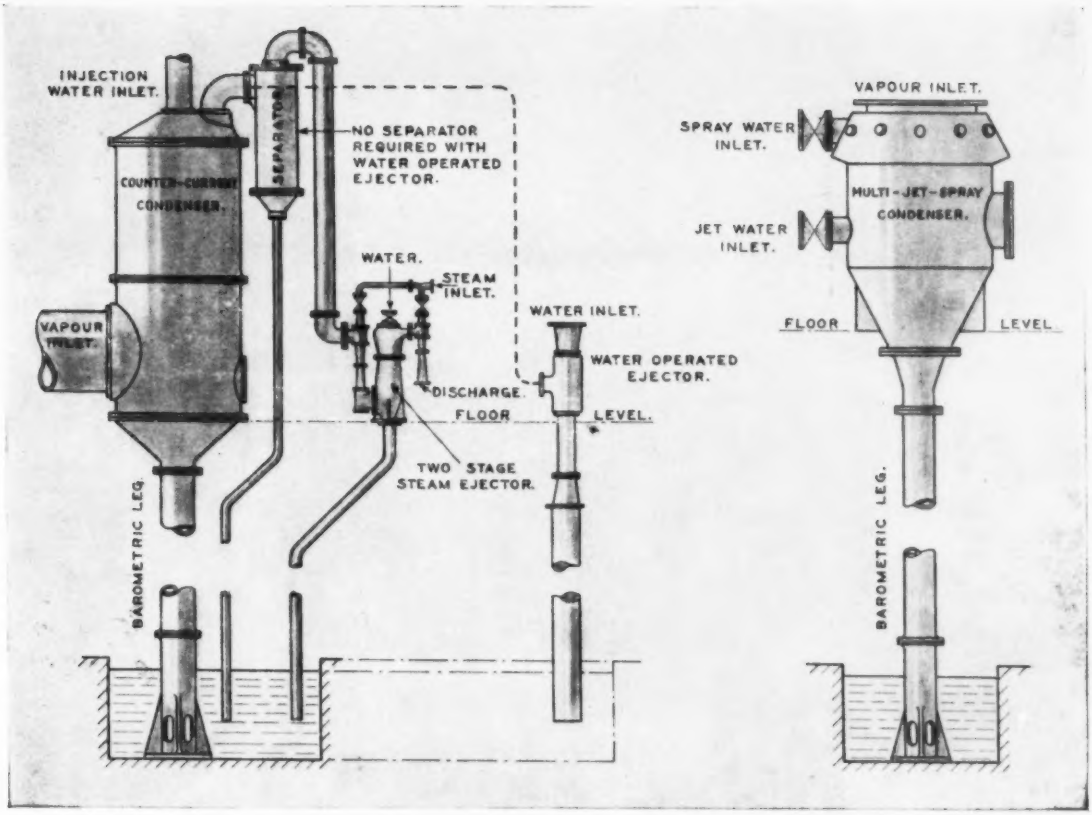
Telegrams :
Boxmag Birmingham

ELECTROMAGNETS LTD

BOXMAG WORKS · BOND ST. · HOCKLEY · BIRMINGHAM 19 · ENGLAND

SUGAR MACHINERY DEVELOPMENTS BY *Mirrlees'*

THE PRODUCTION OF VACUUM WITHOUT MECHANICAL AIR PUMPS



TO SUIT DIFFERENT APPLICATIONS THREE SYSTEMS ARE ILLUSTRATED

WE CAN ADVISE THE MOST SUITABLE FOR YOUR CONDITIONS AND PROVIDE TROUBLE FREE PLANT REQUIRING LITTLE OR NO MAINTENANCE

THE MIRRLEES WATSON COMPANY LIMITED

Head Office and Works:

45 Scotland St. Glasgow Scotland

London Office:

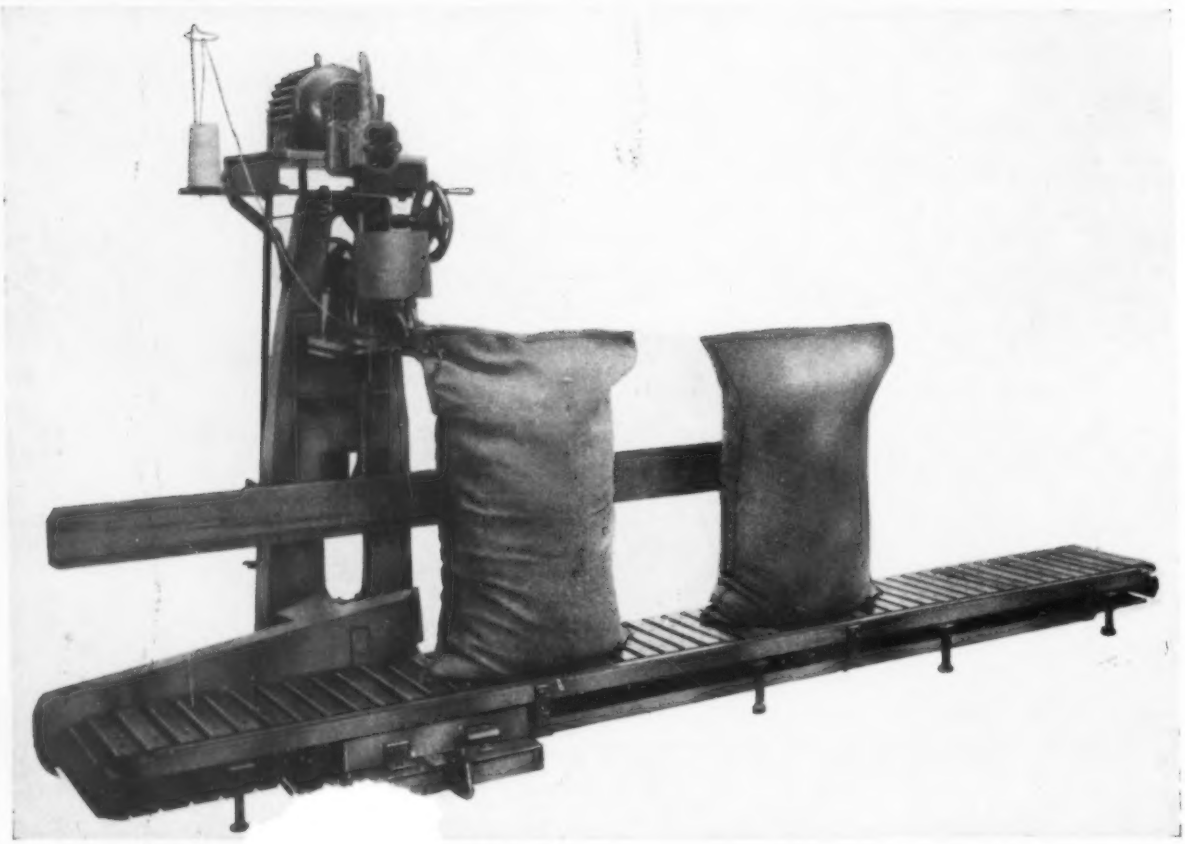
38 Grosvenor Gardens, S.W.1

Cables: "Mirrlees Sowest London"

The 'Super' Universal Sack Closing Machine

MODEL NO. 5B

Fitted with 10 or 12 ft. Conveyor and Special Clutch Drive



This machine is fitted with a conveyor 10 or 12 ft. overall and a Special Clutch Drive which allows the conveyor to be run independently of the sewing head.

Jute, Hessian, Paper Lined Hessian, Cotton and Paper Sacks weighing from 50 to 325 lbs. can be sewn on this machine.

Machines can be seen working by appointment.

Power required 2 h.p. *Shipping weight : 14 cwts.*

Manufactured in **Great Britain** by :

The Sack Filling & Sewing Machine Syndicate Limited

(Timewell's Patent)

TIMEWELL WORKS · LOCKFIELD AVENUE · BRIMSDOWN · ENFIELD . MIDDX.

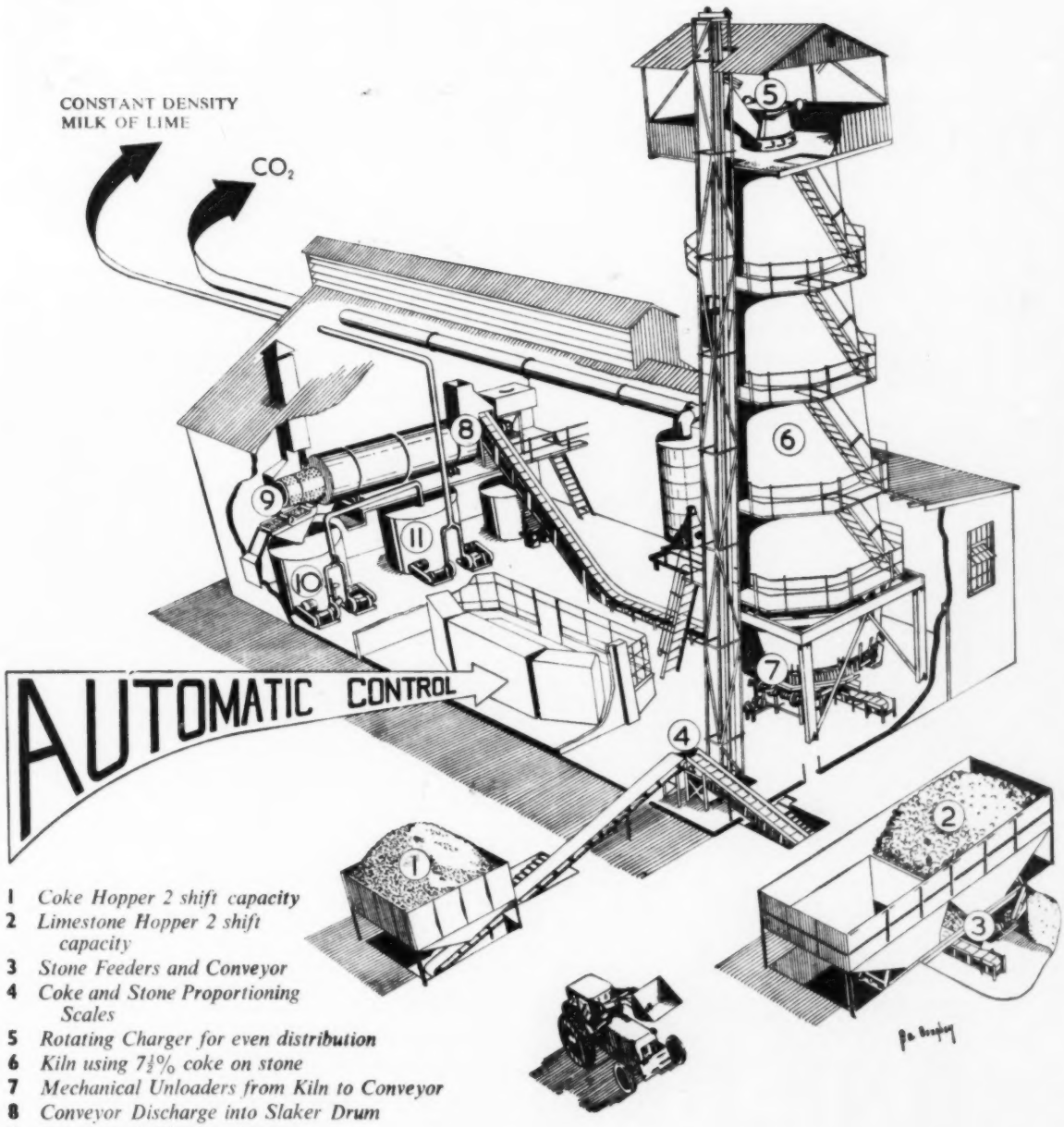
Telephone : HOWARD 1188 *Telegrams :* FECIT, ENFIELD

CONSTANT DENSITY

MILK OF LIME PRODUCTION

USING ONLY ONE OPERATOR PER SHIFT

AS SUPPLIED TO THE **BRITISH SUGAR CORPORATION**



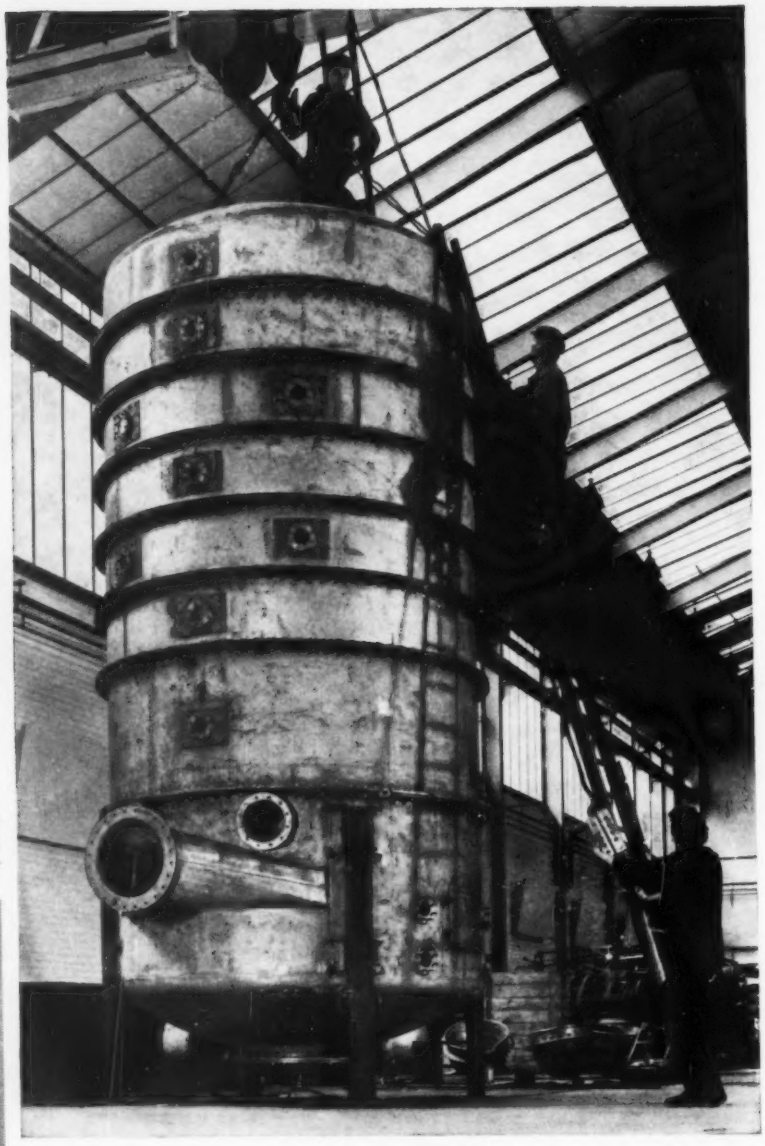
1 *Coke Hopper 2 shift capacity*
2 *Limestone Hopper 2 shift capacity*
3 *Stone Feeders and Conveyor*
4 *Coke and Stone Proportioning Scales*
5 *Rotating Charger for even distribution*
6 *Kiln using 7½% coke on stone*
7 *Mechanical Unloaders from Kiln to Conveyor*
8 *Conveyor Discharge into Slaker Drum*
9 *Rotary and Vibrating Screens*
10 & 11 *Milk of Lime Density Correction and Storage Tanks*

COCKSEDGE & Co LTD

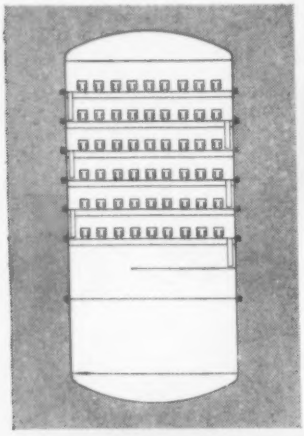
Telephone: Ipswich 56161 (5 lines) **IPSWICH . ENGLAND** *Telegrams: Cables:* *Cocksedge, Ipswich*

another welded fabrication by CLARKS

OF HULL



STAINLESS STEEL ABSORPTION COLUMN 8' DIAMETER 26' OVERALL HEIGHT



By welding a century's experience of fabricating work with today's most modern methods and equipment, Clarks come nearer than most to giving their customers everything they want. Contact Clarks for the **practical** approach to your next job!

CLARK

STAINLESS STEEL, MILD STEEL, COPPER AND ALUMINIUM FABRICATIONS COMPLETE WITH VALVEWORK AND PIPEWORK
METALLIC ARC WELDING
ARGONAUT AND ARGON-ARC WELDING
STRESS-RELIEVING AND TESTING FACILITIES

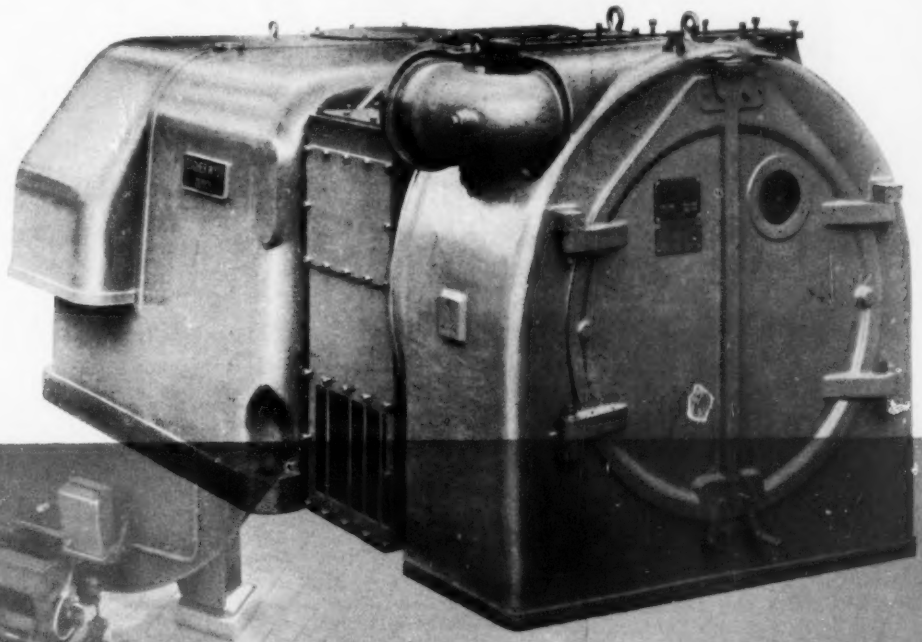
GEORGE CLARK & SONS (HULL) LTD. HAWTHORN AV. HULL

A member of the Newman Hender Group • *Telephone: Hull 37652* *Telegrams: "Clark Hull"* BCA

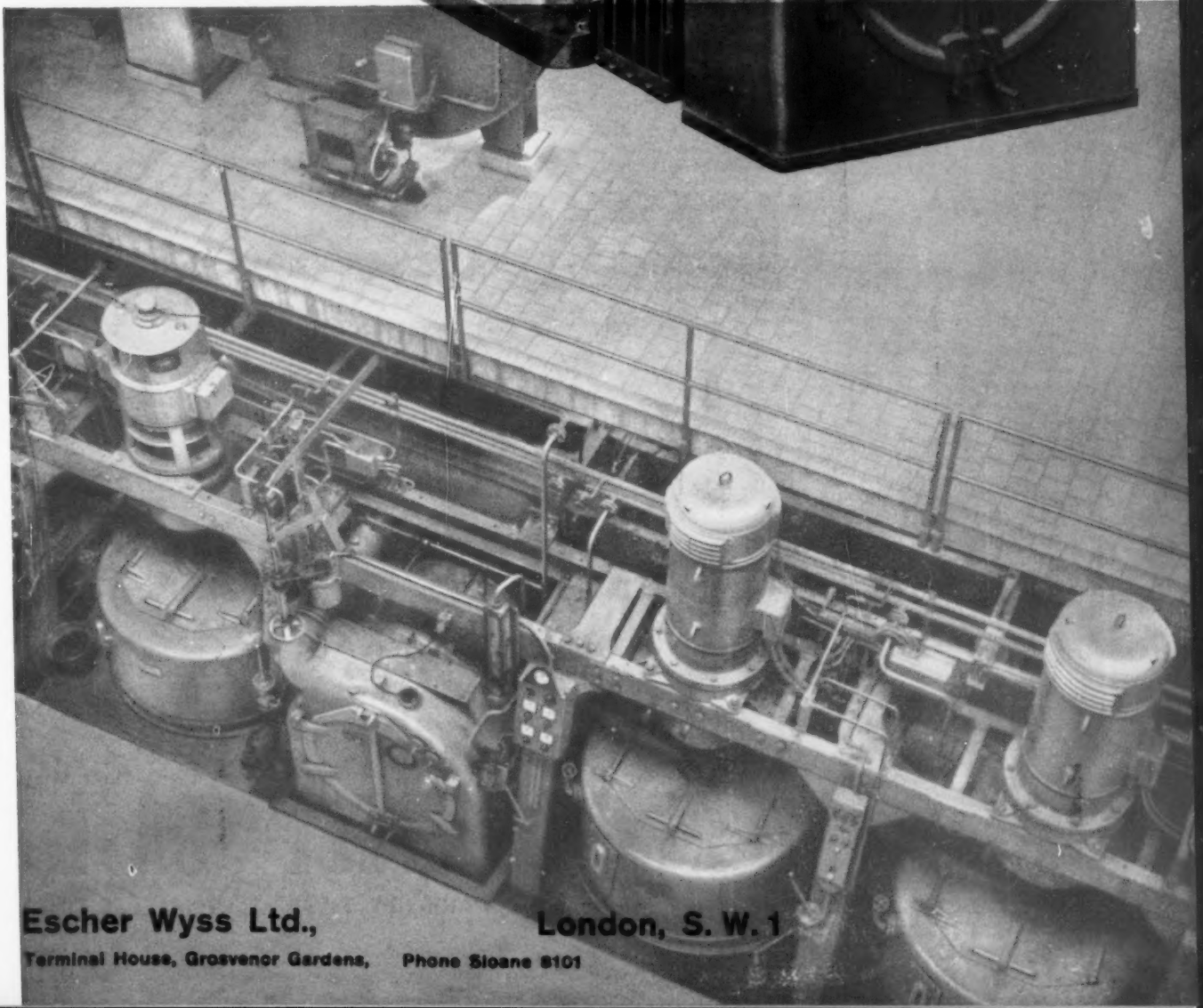
ESCHER WYSS

continuous centrifuges for the sugar industry

These centrifuges are in operation at Sugar Factories throughout the world.



Escher Wyss Centrifuge as replacement in a battery of vertical machines.



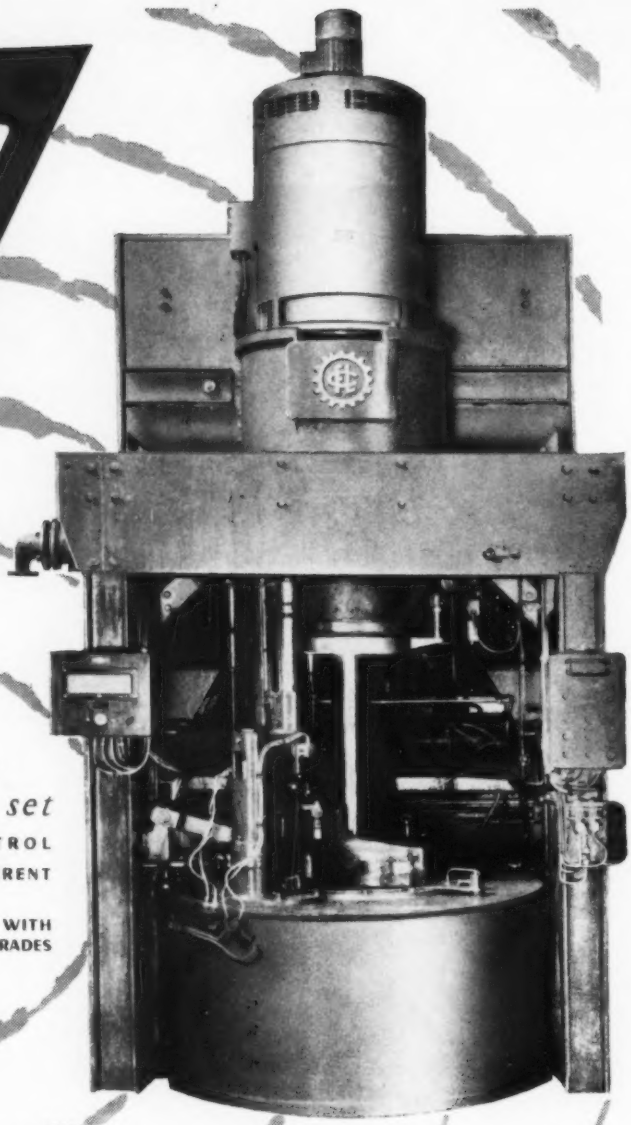
Escher Wyss Ltd., **London, S. W. 1**

Terminal House, Grosvenor Gardens, **Phone Sloane 8101**

Fully automatic!

the new

CENTRIFUGAL



driven by
WARD-LEONARD *set*

- ELECTRONIC CONTROL
- ELIMINATION OF CURRENT PEAKS
- RECORD PRODUCTION WITH MASSECUITES OF ALL GRADES

Battery of 4 centrifugals at the Fontaine-le-Dun Sugar Factory (France)

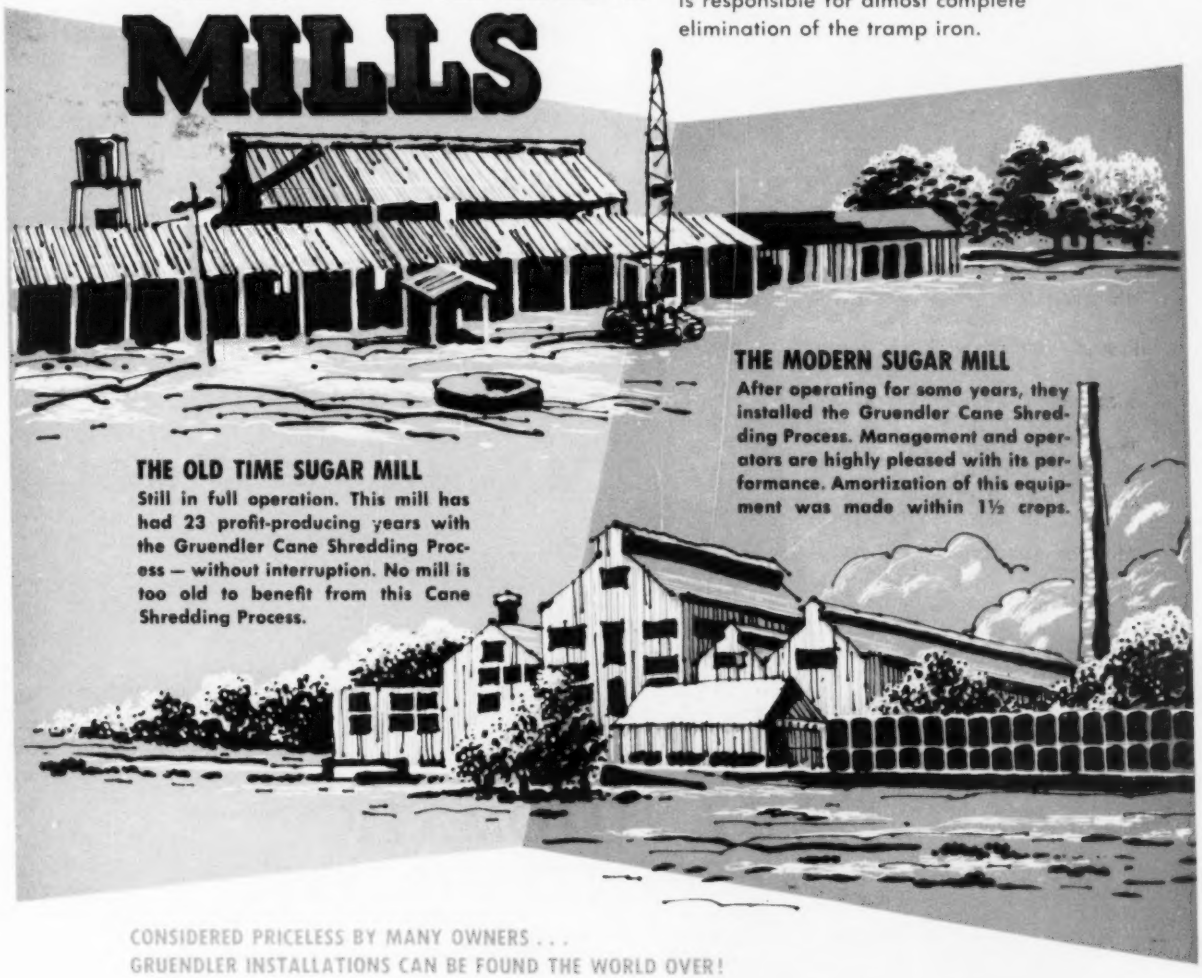
S.A.G. - PARIS

FIVES LILLE - CAIL

7, rue Montalivet, PARIS (8e) - Tél.: ANJou 22-01 et 32-40

A TALE OF TWO SUGAR MILLS

This story of two sugar mills, — one old, one new — proves the value of the Gruendler Cane Shredding Process to both. The grinding rate and sucrose extraction has been increased in each case, and mill strains have been reduced. The Gruendler Shredding Process is responsible for almost complete elimination of the tramp iron.



THE OLD TIME SUGAR MILL
Still in full operation. This mill has had 23 profit-producing years with the Gruendler Cane Shredding Process — without interruption. No mill is too old to benefit from this Cane Shredding Process.

THE MODERN SUGAR MILL
After operating for some years, they installed the Gruendler Cane Shredding Process. Management and operators are highly pleased with its performance. Amortization of this equipment was made within 1½ crops.

CONSIDERED PRICELESS BY MANY OWNERS . . .
GRUENDLER INSTALLATIONS CAN BE FOUND THE WORLD OVER!

INDIA	MEXICO	HAWAII	PHILIPPINES
ARGENTINA	PANAMA	U. S. A.	BRAZIL
AFRICA	CUBA	VENEZUELA	COLOMBIA
MAURITIUS	BOLIVIA	COSTA RICA	PUERTO RICO
	REUNION	CARIBBEAN	

To get the most out of your present cane mill (whether old or new), write for Bulletin No. 10. It tells you what you should know about the Gruendler Cane Shredding Process.

GRUENDLER
CRUSHER & PULVERIZER COMPANY

ESTABLISHED 1885

2915 North Market
St. Louis 6, Mo., U.S.A.

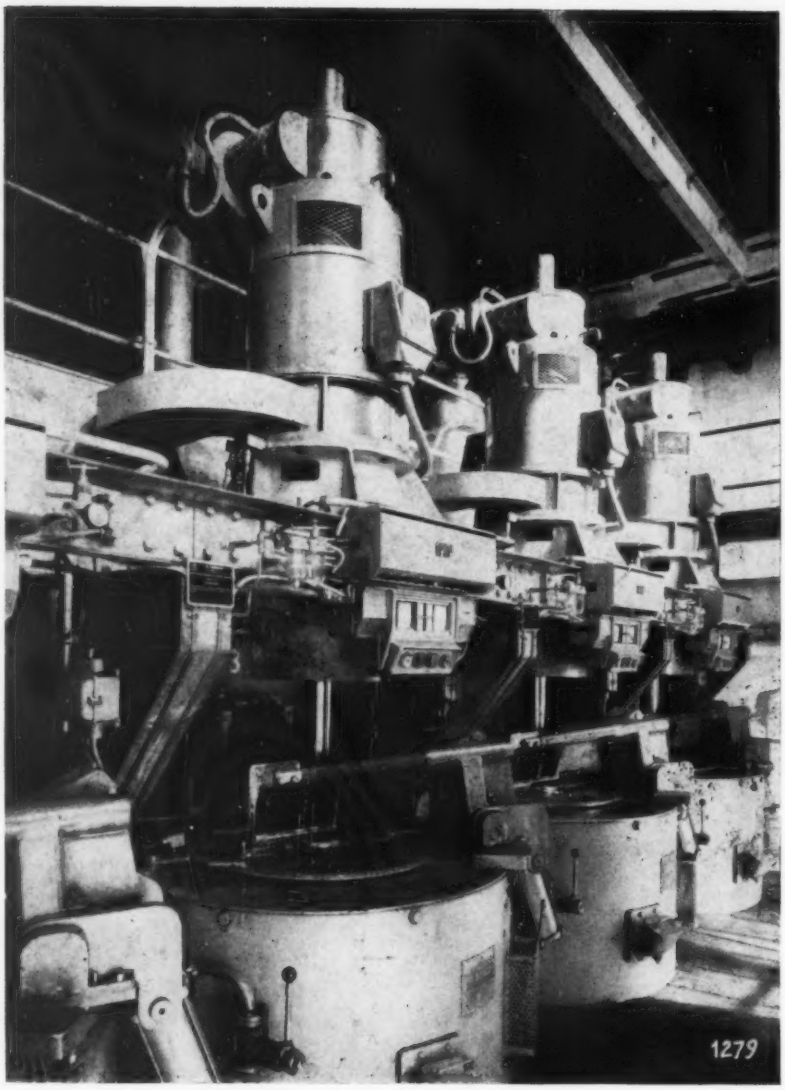
Leo Freeman, V.P. Sugar Mill Div.
2530 Terrace Ave., Baton Rouge, La., U.S.A.

MANUFACTURERS OF SHOCK GRAIN PULVERIZERS, CANE TRASH DISINTEGRATORS, BAGASSE CLEANER AND FILTER AID, BALE BREAKERS, ELEVATING AND CONVEYING EQUIPMENT

x

Since it was established in 1890, our Company has manufactured machinery for the sugar industry, and for more than forty years has specialized in constructing centrifugals.

Our Technical Service is continually developing machines which incorporate improvements designed to meet the technological requirements of new and varying processes in the sugar industry, taking into account the demands of the European Common Market. These new centrifugals are distinguished for their high grade of *standardization* and for their low cost both from the point of view of the purchase price and running costs.



FULLY AUTOMATIC SUGAR CENTRIFUGALS

Type	*Basket D × H*	*Basket cross section*	*Massecuite Max. Charge*	*Performances*		
				Mod.	*Max. sp. r.p.m.*	*Cycles per hr.*
"SCARA. U"	1250 × 830 mm.	Cylindrical with truncated cone shaped bottom	500 kg.	Normal	1000	30
				Velox	1500	25
"SCAME. P"	1050 × 585 mm.	Cylindrical with flat bottom	350 kg	Normal	1500	20
				Velox	1800	10
"SCAME. G"	1220 × 762 mm.	Cylindrical with flat bottom	650 kg.	Normal	1000	25
				Velox	1500	20

BOSCO TERNI

Officine Meccaniche e Fonderie

A. BOSCO

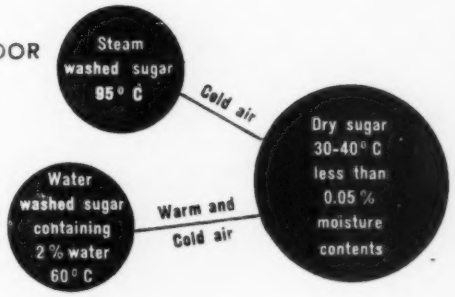
TERNI **ITALY**

WERKSPOOR grasshopper type dryer-cooler at First Netherlands Co-operative Beet Sugar Factory "Sas van Gent"

This new **WERKSPOOR** ***grasshopper type dryer-cooler keeps the lustre of your sugar***

with its simple and low construction, economical working, built in any capacity you may require, this modern WERKSPOOR apparatus will guarantee you:

- **absolutely undamaged crystals**
- **drying and cooling in record time**
- **close contact air-sugar**
- **completely dust free atmosphere**


Steam washed sugar 95° C
Cold air
Dry sugar 30-40° C less than 0.05 % moisture contents
Water washed sugar containing 2 % water 60° C
Warm and Cold air

STORK · VERENIGDE MACHINEFABRIEKEN · V·M·F · NEDERLAND · STORK · WERKSPOOR · WERKSPOOR

For grasshopper type dryer-coolers please apply to Werkspoor, Amsterdam

Baudouin

THE ROOT OF A GOOD CUBE

Chambon

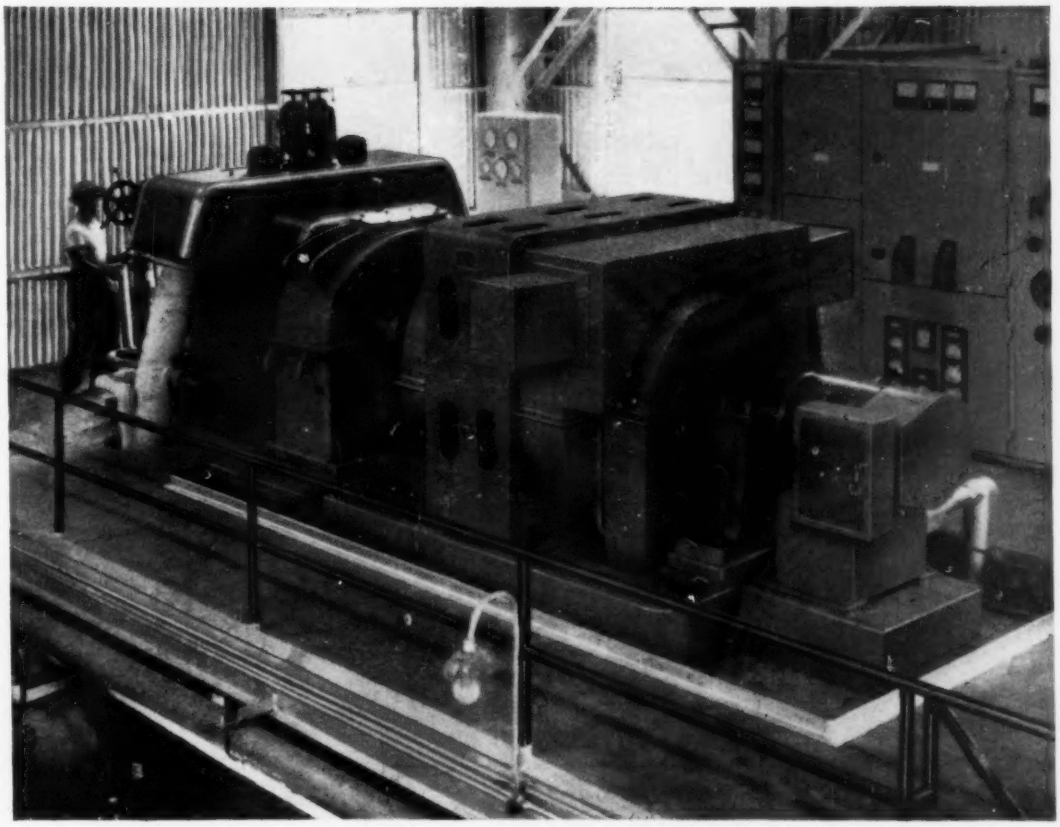
SUGAR MOULDING AND PACKETING PLANT

Chambon Sugar Plant produces perfect cubes or dominoes. The moulding, drying, packeting and weighing is carried out in one continuous operation with simplicity and speed. Its requirements in labour and floor area are small in relation to its high productive capacity.

Illustration shows final stage of automatic process.

CHAMBON LIMITED, RIVERSIDE WORKS, HAMMERSMITH, LONDON, W.6.
Telephone RIVerside 6086

TWIN OUTPUTS
REDUCE FUEL COSTS



This 1,500 kW, 8,000/1,200 r.p.m. geared back-pressure steam turbo-alternator set at a cane sugar mill at San Carlos in the Philippines also supplies 60,000 lb/hr low pressure steam for process purposes under full load conditions.

'ENGLISH ELECTRIC' industrial steam turbo-alternator sets keep fuel costs to the minimum by providing two outputs—electrical power and process steam—from a single installation. The range of back-pressure and condensing steam turbines covers most industrial needs and meets wide variations of steam and electrical loads. Electrical outputs range from 500 kW to 6,000 kW.

'ENGLISH ELECTRIC'
steam turbines

THE ENGLISH ELECTRIC COMPANY LIMITED, ENGLISH ELECTRIC HOUSE, STRAND, LONDON, W.C.2
Steam Turbine Division, Rugby
WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

ST. 41

Meet every cane carrying need with LINK-BELT

SS-600

CHAIN

Here's the chain that satisfies the demands of the most severe cane carrier service. In fact, with an average ultimate strength of 100,000 lbs., Link-Belt SS-600 chain is the strongest for its weight per foot of any cane carrier chain.

There's good reason for such remarkable capacity. Manufacture and assembly of this 6-inch pitch chain are closely controlled to provide the extra wear resistance necessary for long, trouble-free operation.

In addition to SS-600 chain, Link-Belt offers other 6-inch as well as 8-inch pitch carrier chains. Link-Belt can also furnish cane carrier slats in a broad range of types and sizes. For facts, call your Link-Belt representative or write for Book 2640 covering all Link-Belt sugar-handling equipment.

15,052R

LINK-BELT

CHAINS AND SPROCKETS

LINK-BELT COMPANY: Engineers · Manufacturers · Exporters of Machinery for Handling Materials and Transmitting Power Established 1875. **EXPORT DIVISION**: Dept 261-18J, 233 Broadway, New York, 7, U.S.A., Cable Address: Linkbelt—New York · Australia, Marrickville (Sydney) · Brazil, Sao Paulo · Canada, Scarboro (Toronto) · South Africa, Springs · Switzerland, Geneva . Representatives Throughout the World

SIDEBARS are made of medium carbon alloy steel and are heat-treated to give optimum strength. Pin and bushing holes are accurately machined for correct pitch.

ROLLERS are accurately machined and case-hardened to give long life. Bored smooth and true, they are finish ground on the O.D. to assure free rolling and minimum wear.

BUSHINGS are case-hardened and accurately made to close tolerances. The O.D. is finish ground for controlled press fit in the sidebars and to provide smooth, even bearing surfaces for the rollers.

PINS of alloy steel are heat-treated and finish ground. They are positively locked against turning in the sidebars. Holes are drilled in pins and bushings for pressure lubrication.

COTTERS are furnished in brass as standard for greater corrosion resistance.

YORKSHIRE IMPERIAL METALS LIMITED

YORKSHIRE IMPERIAL

place at your disposal
their long, specialised experience
in the metallurgical development
and manufacture of

TUBES FOR THE SUGAR INDUSTRY

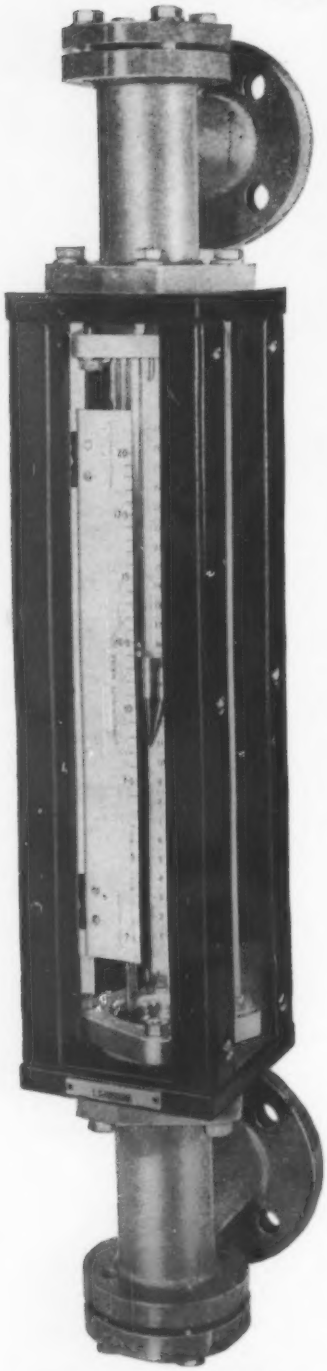
The resources of Yorkshire Imperial Metals Limited are devoted solely to the manufacture of non-ferrous tubes, plates and fittings, and plastic tubes and fittings. They have long been intimately associated with the Sugar Industry, both at home and overseas, and have made a careful study of the varied and often arduous operating conditions which obtain in the Industry. This study has resulted in the development of improved tube and plate alloys, metallurgically designed and scientifically manufactured to give the best possible service. This unrivalled experience is at your service, free of charge and without obligation, to assist in the solution of problems of all kinds affecting the life and use of non-ferrous tubes and plates.

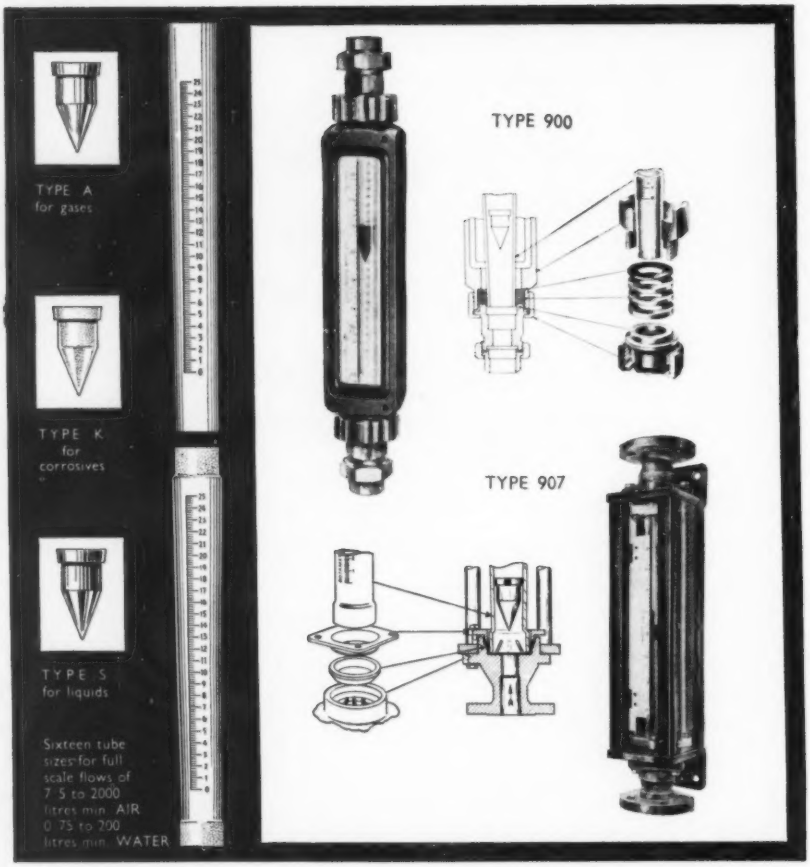
Yorkshire Imperial craftsmanship, metallurgical skill and specialised experience, together with modern plant and methods and accurate control at every stage of manufacture, account for the enviable reputation which *Yorkshire Imperial* tubes and plates and *Yorkshire Imperial* fittings have achieved in their respective fields.

TUBES IN "YORCORON" · "KUNIFER 10" · COPPER AND "SEVA" BRASS · PLATES IN A WIDE RANGE OF ALLOYS · BI-METAL TUBES AND PLATES.

HEAD OFFICE—P.O. BOX 166, LEEDS. TELEPHONE: LEEDS 7-2222

This is rationalised flow measurement





the 'Metric' series Rotameter

The "Metric" series of flowmeters is available from stock. Interchangeable and alternative metering elements provide a new flexibility in liquid and gas rate-of-flow measurement.

In Principle

Five sizes of mounting accommodate the sixteen sizes of glass metering tube and all have rationalised installation dimensions. Floats of stainless steel, light alloy, or korannite (a ceramic material) and all components are interchangeable for a given size.

In Practice

Interchangeable floats of different composition facilitate the conversion of an instrument to meter fluids of different natures; flow scales can also easily be changed as appropriate. These flow scales refer directly to the millimetre scale fused on to the glass tube; they can be provided by the manufacturer or produced by the user from calibration charts.

The type 900 Frame is for low pressure non-corrosive service.

The types 907 and 914 Frames are for rough industrial service and use the Metric 'B' tubes with ground ends and interchangeable gland packing including P.T.F.E. The chassis is a welded structure, nylon covered, and connections are normally of cast iron, stainless steel or rigid P.V.C. Many accessories including a photo-electric alarm can be fitted to these instruments.

Magnetic coupled indicating or transmitting flowmeters using "Metric" elements are available in certain sizes. All metric meters and spare parts are available from stock.

ROTAMETER
FLUID MEASUREMENT AND CONTROL
FLOW-DENSITY-LEVEL

Write for full technical details, quoting reference IS/2020/41

ROTAMETER MANUFACTURING CO. LTD., PURLEY WAY, CROYDON, SURREY Telex: 24292 Telephone: CROydon 3816/9

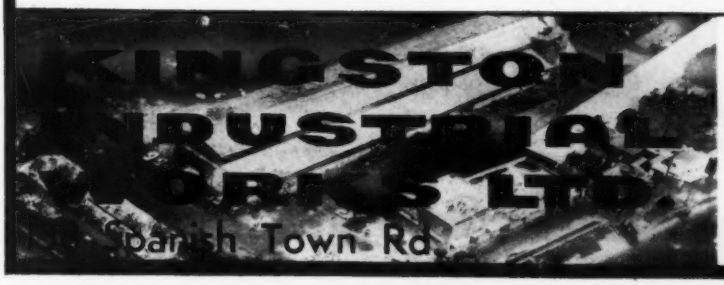
M.41 414

Every Estate in the Country uses

K. I. W. ROLLERS

ROLLERS by K. I. W.

- MANUFACTURED AND RE-CAST
- UNDER EXPERT SUPERVISION
- TRIPLE CHECKING SYSTEM
- OPEN GRAIN • EVEN WEAR
- HIGHEST GRADE STEEL SHAFTS
- MOST COMPETITIVE PRICES



For QUOTATIONS
Cable INDUSTRIAL
Kingston 11. Jamaica.

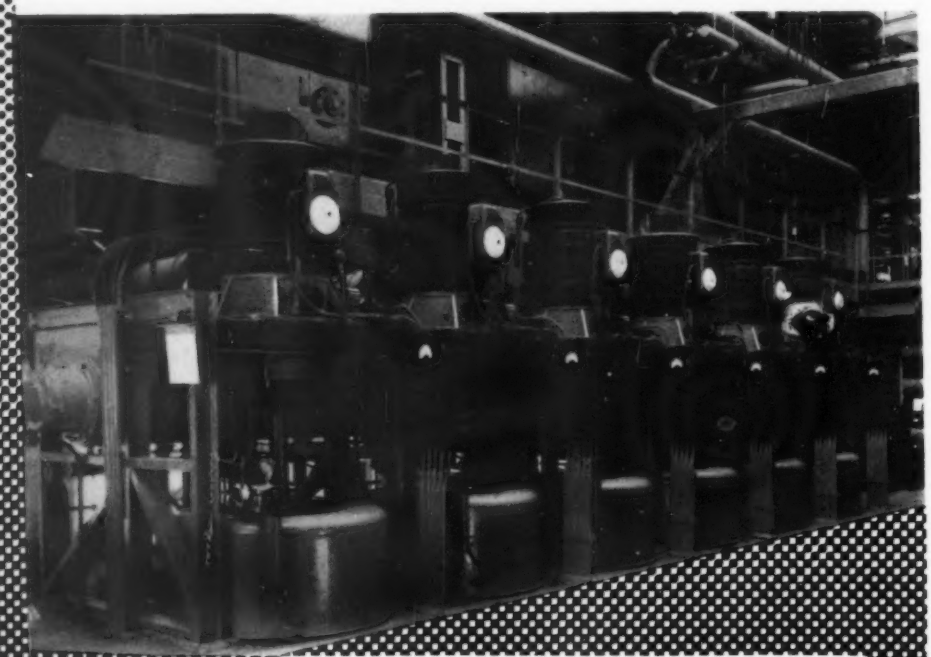
HIGH SPEED CENTRIFUGALS

of 48 in. diameter, provided with automatic control of all operations during the curing cycle, with commutator electric motors with regeneration of electric power into the mains, secure—

quicker and higher quality curing of massecuite with less supervision, thus ensuring higher output, economy in power consumption and elimination of surges in electric power demand.

We deliver complete plant for beet and cane sugar factories, and for refineries as well as individual pieces of equipment, and equipment for reconstruction.

The dozen sugar mills constructed in the recent years in various countries are a proof of the high standard of the products of SKODA manufacture.

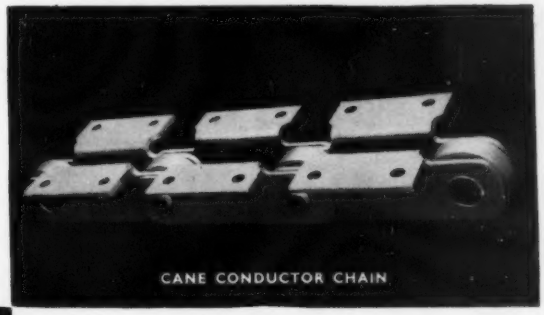


TECHNOEXPORT

Foreign Trade Corporation for Export of Complete Industrial Plants

Praha 1, Václavské nám. 56. Czechoslovak Socialist Republic

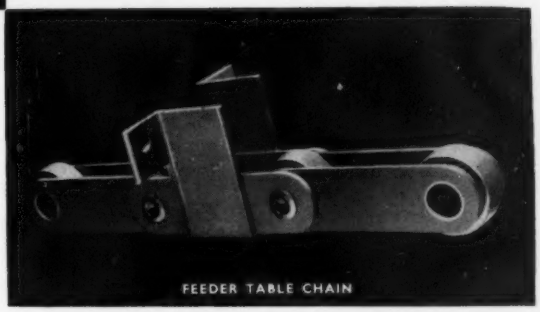
versatile
RENOLD
chains
last
longer



CANE CONDUCTOR CHAIN

BAGASSE CHAIN

move
cane
and
sugar
quicker



FEEDER TABLE CHAIN

Renold conveyor chains, specially designed and manufactured for heavy and arduous duties such as cane and bagasse handling, were first supplied to the industry in 1920 and some installed in Cuba in 1925 are still in service after carrying over 6½ million tons of cane. They offer the attractive combination of high strength and low price and are outstanding in providing 20% more bearing area than most competitive makes.

RENOLD

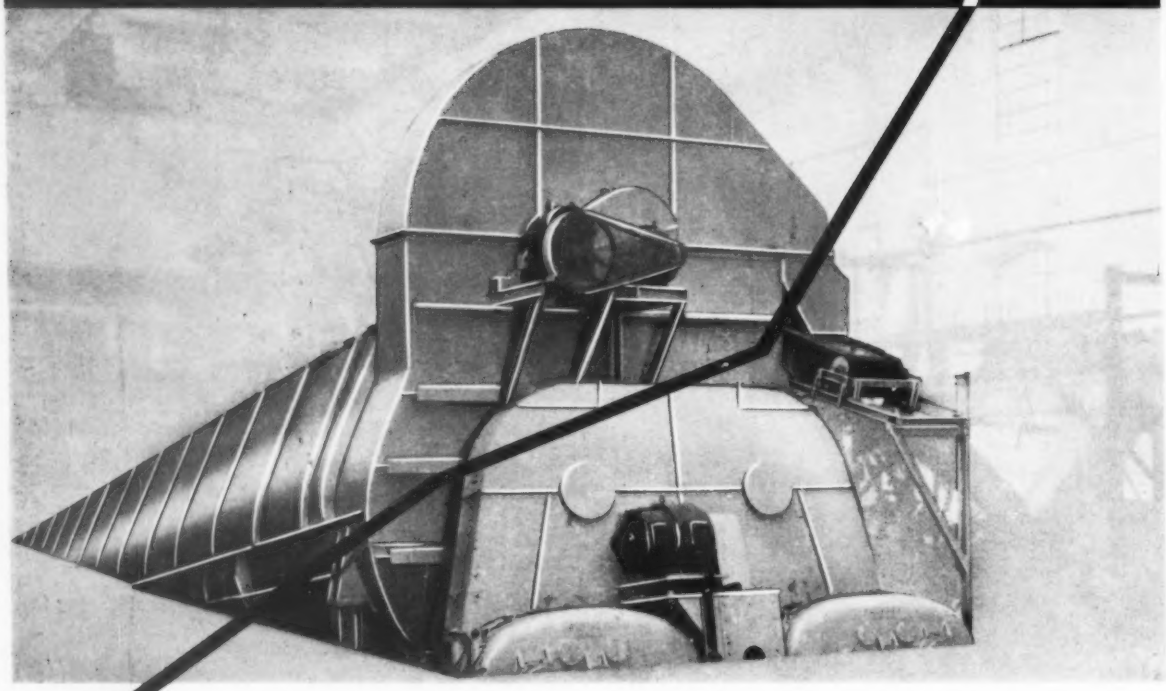
CONVEYOR CHAINS FOR THE CANE SUGAR INDUSTRY

RENOLD

RENOLD CHAINS LIMITED · MANCHESTER

During the last year more than 50 plants ordered...

D.d.S.
DIFFUSION



The still increasing sale is the best proof of quality and capacity.
Now more than 100 diffusers under construction and in operation.

AKTIESELSKABET
DE DANSKE SUKKERFABRIKKER
COPENHAGEN

VOL. 63 *February, 1961* No. 746

International Sugar Journal

Editor and Manager :
D. LEIGHTON, B.Sc., A.R.I.C.

Agricultural Editor:
H. MARTIN-LEAKE, Sc.D.

Assistant Editor:
M. G. COPE, A.I.L.(*Rus.*)

Panel of Referees

L. D. BAVER,
Director, Experiment Station, Hawaiian Sugar Planters' Association.

A. CARRUTHERS,
Director of Research, British Sugar Corporation Ltd.

F. M. CHAPMAN,
Technical Adviser, Tate & Lyle Ltd.

J. EISNER,
Technical Adviser, Booker Bros. McConnell & Co. Ltd.

P. HONIG,
Consulting Sugar Technologist.

J. CAMPBELL MACDONALD,
Chief Technical Officer, British Sugar Corporation Ltd.

H. C. S. DE WHALLEY,
Consultant, Tate & Lyle Ltd.

O. WIKLUND,
Swedish Sugar Corporation.

* * *

Published by
The International Sugar Journal Ltd.
Central Chambers, The Broadway,
London, W.5.
Telephone : EALing 1535
Cable : Sugaphilos, London.

* * *

Annual Subscription: 32s. 0d. or $5.00 post free
Single Copies: 2s 6d or 45 cents post free

PAGE

Notes and Comments 33
The No. 4 New York Contract. Cuban trade agreements with communist countries. U.S. sugar supplies. Tate & Lyle Ltd. 1960 Report. Indian sugar situation.

* * *

Agricultural Articles:

The Sugar Cane in Jamaica 35

Sugar Cane Agriculture in Taiwan 35

Sugar Cane Agriculture in Queensland 36

Agricultural Activities in Louisiana 37

Agricultural Abstracts 36, 37, 38

* * *

General Articles:

Recirculation of Over-Saturated Pre-Liming Sludge Concentrate 39
A new method of juice purification
By S. Wramstedt

Refractive Index of Sucrose Solutions 42
A Statistical Appraisal
By S. Hill and W. J. H. Orchard

The Plaistow Recovery House (Part II) 44
By Colin Lyle

Experiences with Juice Purification (Part II) . 47
By F. Schneider

* * *

Sugar-House Practice 49
Sugar cane diffusion—its effect on factory. The Conklin system of sugar boiling. Steam generation in a raw sugar factory. Vacuum and condensation equipment in sugar factories *etc.*

Beet Factory Notes 52
Problems of filtration. Manometers with elastic measuring units. Some remarks on the carbonate process. Report on the first beet sugar campaign in Pakistan. Simplified calculation of the quantity of pressed pulp *etc.*

New Books and Bulletins 55
The Indian Sugar Industry 1958/59 Annual. Plantation Crops. Official Methods of Analysis of the Association of Official Agricultural Chemists, 9th Edn *etc.*

Laboratory Methods and Chemical Reports 56
Reducing sugar methods. Reconditioning calomel electrodes of pH meters. A sensitive method for detecting sugars on paper chromatograms. Determination of small amounts of lactic acid in the presence of large amounts of sugar *etc.*

By-Products 58
Studies on sugar cane bagasse. II. Sorption studies and density data of bagasse and its fractions. *etc.*

Patents 60
Sugar cane mills. Beet harvesters. Sugar esters. Continuous cane diffuser.

Trade Notices 61
Automatic pipette for beet pol determination. Bin level indicator. The Russell mill. Level control systems. pH by Pye. Torque-flow pump. *etc.*

Stock Exchange Quotations 64

Brevities 63–64

Index to Advertisers xlvi

Water Powered Centrifugals

WITH FLEXIBLE CONTROL FOR ALL GRADES OF SUGAR

Watson Laidlaw Water-Driven centrifugals are designed for consistent reliability and for ease of maintenance . . . no high degree of skill is required for normal upkeep and repairs.

Our "Super" High-Speed Water-Driven centrifugals can easily be adjusted to run at varying speeds, to suit the grade of sugar being treated.

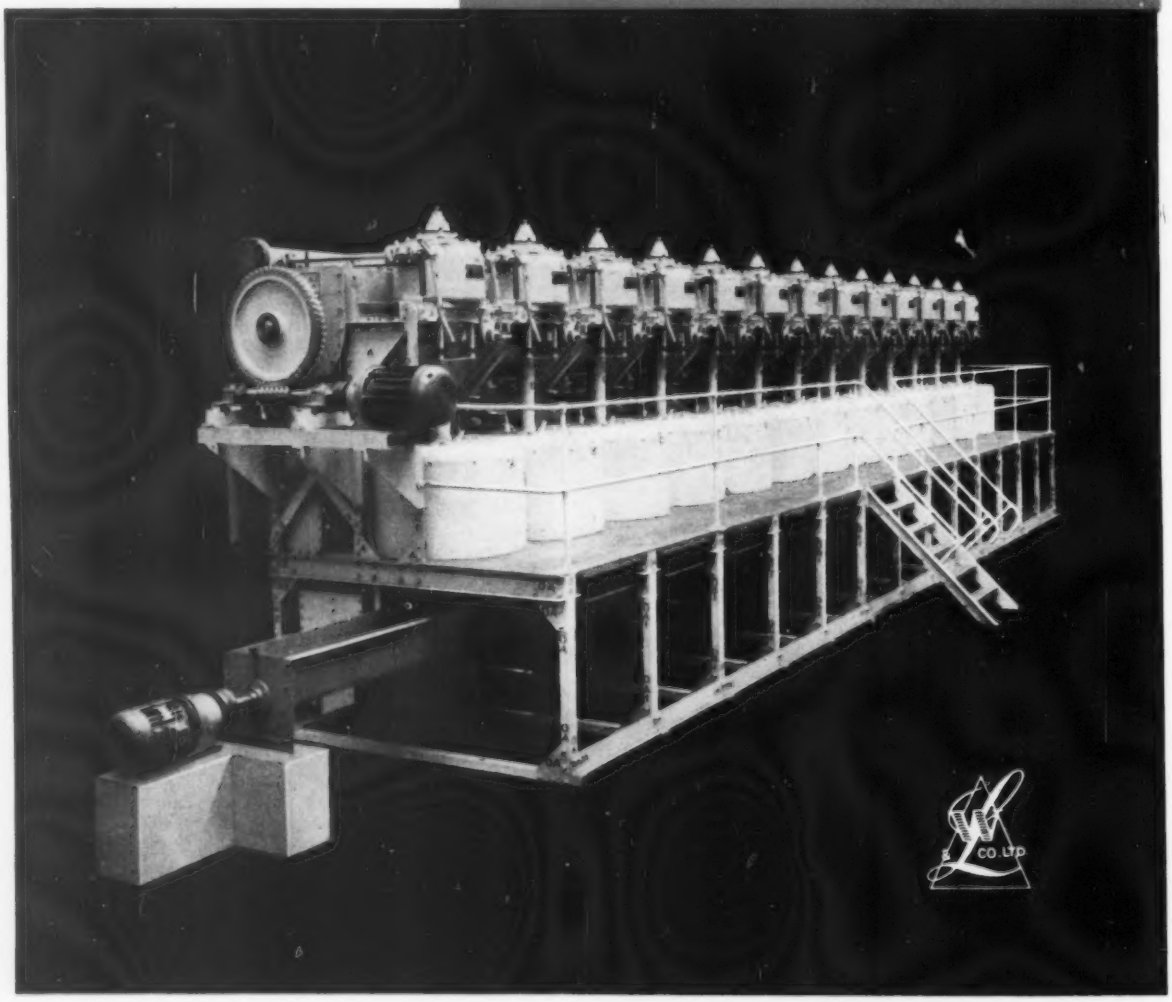
WATSON LAIDLAW
AND COMPANY LIMITED

Designers and Manufacturers of Modern Centrifugal Machines

98 LAIDLAW ST., GLASGOW, C.5.

Telephone: SOUth 2545 *Telegrams:* "FUGAL" Glasgow.

Illustration shows 13—36" × 18" water-driven centrifugals recently erected in our workshop prior to despatch to a sugar factory in Pakistan.



THE
INTERNATIONAL SUGAR JOURNAL

VOL. LXIII FEBRUARY, 1961 No. 746

NOTES AND COMMENTS

The No. 4 New York Contract.

As a result of U.S.–Cuban differences, trading on the No. 4 contract of the New York Coffee & Sugar Exchange became difficult from the middle of 1960, and with the breaking-off of diplomatic relations between the two countries on the 3rd January operations became impossible. The Board of Managers announced on the 6th January, therefore, that operations were to be suspended, and the Contract to be liquidated on the basis of prices ruling at the close on the 5th January. This brought to an end a Contract on which, as remarked by C. Czarnikow Ltd.[1], "nearly 35 million tons had been traded during its thirteen years of life. During that time it was of incalculable value to sugar interests throughout the world and, with other markets still labouring under Government control following the war, it was for many years the sole hedging medium available to international trade in our commodity."

A draft Contract, No. 8, had been prepared and was originally to be submitted to the New York Exchange members on December 13th but was postponed until the beginning of January, coming into effect on the 3rd January. The new Contract covers "raw cane sugar f.o.b. and stowed or in port warehouse of approved foreign country", these countries including Australia, Brazil, Dominican Republic, the West Indies Federation, French West Indies, Haiti, Mauritius, Mexico, Peru, Philippines, Réunion and Taiwan, as well as other countries at the discretion of the Board of Managers of the Exchange. Since the new contract is so widely based, dependence of a major part of the Exchange operations on the stability of a single source is eliminated for the future.

The Ninth Session of the International Sugar Council has been called for the week beginning 20th February 1961. It will consider the position following the suspension of the New York Coffee and Sugar Contract No. 4, which was the basis of operation of the price provisions of the Agreement. The Council will review developments in the sugar market since its Eighth Session. It will also make the final determination of initial export quotas to the free market for 1961.

Cuban trade agreements with communist countries.

A Cuban delegation led by Dr. ERNESTO GUEVARA, President of the Banco Nacional de Cuba, has been visiting the Communist countries of Eastern Europe, and it was announced recently that agreements had been reached for the supply of Cuban sugar to all with the exception of Albania which the delegation had yet to visit. After visiting Moscow, a Cuban-Soviet communiqué was issued on the 19th December which said, according to the Soviet News Agency Tass, that complete agreement had been reached on economic questions. The U.S.S.R. agreed to do its utmost to secure supplies of vital goods for the Cuban economy which could not be purchased elsewhere, and expressed readiness to buy from Cuba 2,700,000 tons of sugar if the U.S.A. did not buy sugar from Cuba in 1961. The price agreed on is 4 cents per lb f.a.s. but the trading will, in fact, be by barter, according to press reports.

Dr. FIDEL CASTRO, speaking at the close of the National Assembly of the Federation of Sugar Workers, is reported to have said that Cuba would produce 4 million tons of sugar at 4 cents per pound—last year's cost price—and cut the rest of the cane for production of sugar at 2·5 cents per pound. The stock of below-cost sugar would be "sacrificed" to the world market at opportune moments and the threat of its dumping would discomfit "imperialism".

* * *

U.S. sugar supplies.

It was announced on 16th December that the U.S. sugar requirements for 1961 had been determined at 10,000,000 short tons. As the current Sugar Act expires at the end of March it was only possible to allot quotas for the first quarter and this was done in accordance with the Act. It was proclaimed, however, that the President had decided to withhold the Cuban quota, amounting to 824,299 tons, and on the 22nd December the U.S. Department of Agriculture, with the concurrence of the Secretary of State, authorized the purchase of this amount of non-

[1] *Sugar Review*, 1961, (490), 17.

quota sugar from approved sources. Sugar from the Dominican Republic will be subject to a fee of 2¼ cents per lb (See *I.S.J.*, 1960, **62**, 302). It was felt that Peru and Nicaragua would not be able to utilize their entire non-quota allocations and accordingly these were limited to 215,000 short tons and 16,000 short tons respectively, leaving 28,465 tons and 19,009 tons respectively to be redistributed. Of this quantity 10,000 tons were allowed to Taiwan in addition to the non-quota allocation of 1505 tons which had already been granted, whilst the balance was shared among countries which do not possess basic entitlements.

Quotas and non-quota allocations as they stand at the time of writing are as follows:—

	Basic Quota	*Non-Quota*	*Total*
	(*Short tons, raw value*)		
Domestic Beets	544,443	—	544,443
Mainland Cane	167,531	—	167,531
Hawaii	303,853	—	303,853
Puerto Rico	317,716	—	317,716
Virgin Islands	4,332	—	4,332
Philippines	245,000	122,683	367,683
Peru	30,377	215,000	245,377
Dominican Republic	27,789	222,723	250,512
Mexico	23,852	191,168	215,020
Nicaragua	4,368	16,000	20,368
Haiti	2,067	433	2,500
Netherlands	1,037	1,463	2,500
Taiwan	995	11,505	12,500
Panama	995	1,505	2,500
Costa Rica	992	1,508	2,500
Canada	158	1,266	1,424
United Kingdom	129	1,034	1,163
Belgium	45	361	406
British Guiana	21	168	189
Hong Kong	1	8	9
B.W.I.	—	10,000	10,000
El Salvador	—	2,000	2,000
Brazil	—	11,474	11,474
Colombia	—	6,000	6,000
Ecuador	—	6,000	6,000
Guatemala	—	2,000	2,000
	1,675,701	824,299	2,500,000

* * *

Tate & Lyle Ltd. 1960 Report.

Sales of refined products totalled 1,985,497 tons against 2,113,665 tons in 1959, the proportion to the home trade (73%) being unchanged. The main export markets in the Commonwealth were again Nigeria, Ghana, British East Africa and Malaya, while outside the Commonwealth, Norway, Switzerland, Iraq, the Persian Gulf area and Tunisia featured prominently. The balance of the trade was made up of small sales to a large number of markets. The margin on Home trade sales continued well below the limit guaranteed to the Chancellor of the Exchequer. Controlling interest in Canada & Dominion Sugar Co. Ltd., acquired in November 1959, cost £6,386,670 and was financed largely by sale of 5½% Debenture stock 1980/85 and the remainder by bank borrowing. The Canadian subsidiary is made a feature of the accounts, a considerable number of colour photographs of the refineries and of Chatham beet sugar factory being included, as well as a photograph showing some of the 42 different varieties of Redpath and Dominion products sold throughout Eastern Canada.

* * *

Indian sugar situation[1].

A decided change has come over the Indian sugar situation and the problem of satisfying to the full the consumption needs of the country has now given place to concern as to the disposal of surplus stock.

As recently as last year local shortages of sugar were making themselves felt in India. Despite an embargo on exports the position became so serious that by end-October, when the 1958/59 season closed, stocks had dwindled to around 173,000 tons, which represented no more than 4½ weeks' reserve even discounting the vast distribution difficulties which exist in India.

Meanwhile, to encourage the expansion of output the Government had introduced certain fiscal measures and also sanctioned an increase in the price of cane. The results which have followed these moves, which were aided by favourable weather during the growing season, have been little short of remarkable. Not only did production of white sugar in the 1959/60 season reach the all-time record of some 2,420,000 tons, an increase on the previous season's output of no less than 500,000 tons, but according to some early estimates outturn in 1960/61 will be in excess of 2,600,000 tons. The cane is said to be in exceedingly good condition whilst factory capacity is constantly being enlarged.

A new problem now faces India. Although there has been some expansion in consumption, due in part to the increasing population, it seems that if the present trend continues domestic offtake is unlikely to exceed 2,200,000 tons during the current season. Whether this will lead to the accumulation of burdensome surpluses depends to a large extent upon the policy which is followed with regard to exports. The difficulty is that the cost of production is considerably in excess of prices at present ruling on the world market. Nevertheless, permission has been granted for 50,000 tons from the 1959/60 crop to be exported and of this quantity something in excess of 30,000 tons has already been placed. It is, of course, obvious that stocks must be kept at a level considerably above the tonnage carried in at the beginning of last season but even so it would appear that provided the crop turns out as expected there will be a margin fully adequate to provide for exports in the region of 500,000 tons.

According to the second official estimate 5,702,000 acres are devoted to sugar cane this season. The second estimate last season was 5,139,000 acres. The expansion in the acreage is said to be partly a result of the better prices now fetched by cane and partly due to the favourable climatic conditions at the time of sowing.

[1] C. Czarnikow Ltd., *Sugar Review*, 1960, (487), 215–216.

THE SUGAR CANE IN JAMAICA

The 1958 Annual Report of the Research Department, The Sugar Manufacturers' Association (of Jamaica), Limited

A SHARP decline in production during the year under review was due to adverse climate, causing both reduced yield of cane and poor quality of juice. Data are given indicating losses of some 2% pol for a one-day interval between harvesting and grinding, 5% for an interval of two days, 12% after four days and 30% after eight days.

On the cultural side, root studies have shown a wide range of penetration dependence on soil character and that, in many areas, free drainage is of primary importance. In this connexion studies in deep tillage are now in hand. A comparison between incorporation of trash and burning prior to replanting showed little difference between the two systems in the plant crop. Spacing experiments indicated an optimum at four feet in plant cane changing to five feet for first and second ratoons. Further subjects briefly noted are drain cleaning, the effect of in-field transport on yield and of bagasse on heavy soils, and the beneficial effect of gypsum on heavy clay.

Nutrition

Comparisons between sulphate of ammonia and urea were unfortunately conducted under conditions where the response to N was small, and increases were slight with a trend only in favour of the sulphate. Percentage N in dry matter leaf was determined for over 1500 fields and, on a basis of 1·5% as adequate, 33 samples showed N deficiency. On the same samples, with a 0·4% P_2O_5 taken as critical, 38 samples showed deficiency, the position being better in the case of K (critical figure 1·2%) with 20% deficient samples. In the case of P, the returns as % of control, for dressings of 1 and 4 tons triple superphosphate plus 3 cwt sulphate of ammonia per acre were 126 and 147, for 5 and 10 tons filter mud 133 and 145 and for 5 and 10 tons fortified filter mud 151 and 157.

Varieties

The varietal scene is changing rapidly; B 41227 (34% acreage reaped), B 42231 (11%) and B 4362 (25%), all of which made their commercial début in 1951, now occupy 70% of the estate acreage. B 34104 which, in 15 years, came to occupy over 50% of the area now, 7 years later, occupies only 4% and is now discarded. Numerous varieties of more recent origin are under trial.

Diseases and Pests

The species of nematodes, both parasitic and saprophytic, found at Worthy Park, are listed. B 41227 appears to be less affected than B 4362. Trials with insecticides indicated that D.D. first heavily reduced the nematode population only to be followed by a rapid build-up to an increased density; 118% in the case of B 41227 and 32% in the case of B 4362. This difference, it is suggested, may be due to the more vigorous root development of the former with the provision of a larger food supply for the pest.

Notes are also given of an outbreak on three estates of the West Indian cane fly, (*Saccharosydne saccharivora*), of a suspected bacterial infection at Rose Hall and Monymusk and on ratoon stunting disease, for which a table of varietal susceptibilities is given, based on inoculation.

If a criticism of the Report may be ventured, it is that it is heavily overweighted with tables both in the text and in the 68 pages of appendices. To mention only one example: there can be little of general interest to justify the page of monthly rainfall data for the three years, 1956–1958, at 20 stations, or the page of number of days with rainfall in excess of 0·5 in for each month within the same period and at the same 20 stations.

H. M.-L.

SUGAR CANE AGRICULTURE IN TAIWAN

Report of the Taiwan Sugar Experiment Station, No. 20, December, 1959.

A SERIES of papers, in Chinese with English summaries, forms the body of this report. Field experiments in the use of molasses as fertilizer both alone and in combination with bagasse and filter press mud on a sandy soil are described by P. N. SOONG *et al.* They cover a six-year period. Molasses alone or in combination gave increased yields, and, applied in alternate years, showed a residual response. In all cases, the effect in spring-planted and ratoon crops was greater than in those autumn-planted.

The effects of green manure and nitrogenous fertilizer covering three crop years are reported by J. J. SHIUE. It is calculated by statistical analysis that 20–40 tons green manure saved 39 to 63 kg fertilizer per ha in the plant crop, 60–86 kg in first ratoons and 36–57 kg in the second ratoons.

The beneficial effect of soil fumigation was found by H. T. CHU *et al.* A significant reduction in nematode population is associated with increased growth and yield. Of the fumigants tried, "Ortho-fume 85" was found most effective.

S. LEU and L. CHU show the susceptibility of maize to downy mildew, *Sclerospora sacchari*, when artificially inoculated. In reverse, the conidia from these infected maize plants re-infected cane, especially in the younger stages of growth.

With the growing importance of interplanting beet and rice, an investigation of the variety and environmental relationships as affecting beet disease is given by H. T. CHU and T. K. TSAI. The two most serious diseases are *Sclerotium* and Crown root rots to which must be added the several nematode pests. All three may appear in epidemic form locally.

H. M.-L.

SUGAR CANE AGRICULTURE IN QUEENSLAND

IN the early months of 1960 there appeared the 33rd Annual Report of the Queensland Cane Growers' Association and, in addition, there were held two conferences, of the Australian Sugar Planters' Association and of the Cane Pest and Disease Control Boards.

The immediate question is that raised by the fact that cane production is 1·5 m. tons above that needed to yield the quota requirement. This raises several questions, among them that of intensive *vs.* extensive cultivation. The answer given by the Bureau favours the former. Stand-over cane is undesirable, as it lodges too frequently and becomes a reservoir of diseases and pests, including rats. The most effective means of dealing with this excess cane lay in the use of a slasher which finely divides cane and leaves it as a mulch in the case of ratoons, though with the risk of a build-up of borer population, or to be ploughed in. Released land may be used for green manure crops grown for seed which is in short supply. Under the heading of fertilizers, the Annual Report gives a brief account of the build-up of an Australian fertilizer industry and of the latest developments in mechanical harvesting; the Report by G. QUAID on his visit to Hawaii, Louisiana and Florida is given as an appendix to the Annual Report.

The A.S.P.A. Conference is reported in the *Australian Sugar Journal*[1]. The major item under discussion, opened by G. QUAID, was mechanical harvesting. He laid emphasis on the fact that its introduction offered a point of no return. Once it was introduced, cane cutters ceased to be available—that was Louisiana's experience. On the one hand there is the problem of efficient cutting, one of machine design, to ensure clean cane acceptable to the factory; on the other, the problem of transportation and organization. A machine capable of cutting 200 tons daily has to be fitted into a system where individual deliveries are 20–40 tons or, in the case of group harvesting, 100 tons.

Concomitant problems arising from mechanical harvesting were discussed by N. J. KING. He referred, in the first place, to the difficulties involved in cutting lodged cane. These have largely been overcome but that of topping remains. The answer lies chiefly with the plant breeder in the production of varieties which do not lodge but it is no easy matter to breed such canes adapted to the varying conditions of soil and climate and to arrange in each case a succession of varieties. A further requirement in mechancially cut cane is cleanliness and absence of trash and, as a potential answer, the use of chemical desiccants, such as are used for defoliation of cotton before mechanical picking, is being tried. These, when sprayed onto the crop, render the mass of the leaves fit to burn. Tops have not so far been completely desiccated but their weight is reduced by a half.

The several pests and diseases attacking cane were discussed at the meeting of the Conference of the Cane Pest and Disease Control Boards. Among the subjects discussed is that of ratoon failures and the suggestion was offered that the soldier fly was the offender, stinging the shoot as it emerges.

H. M.-L.

AGRICULTURAL ABSTRACTS

The control of Johnson grass on Smithfield plantation. L. L. ARCENEAUX. *Sugar J.* (La.), 1960, **23,** (2), 31–32.—The system here described in some detail is one for bringing Johnson grass under control where infestation was so heavy that cane growing became almost impossible. The key factors of control are cropping with Alba clover (vars. Florana and Hubam) during the fallow and, immediately following off-barring the stubble, spraying with 12 lb TCA and 1½ lb 2,4-D per acre followed by spot spraying if the grass appears later. The treatment of headlands, ditches and railroads, with the willing co-operation of the rail authorities, is also described.

* * *

Triton, a promising new cane. ANON. *Australian Sugar J.*, 1960, **52,** 220.—Triton is a new two-year variety, bred from Co 270 × Eros by the C.S.R. in 1947, and details of its history and gradual spread are given as also its major characteristics. Besides high yield, resistance to major diseases and clean burns it is both flood and frost resistant. The last character makes it particularly valuable for S. Queensland. Harwood has now 81% of the area under this variety.

* * *

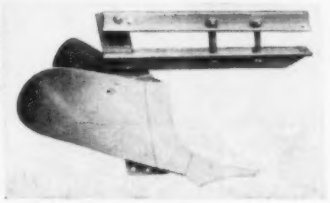
Low yields from cane through lack of maturity. A. F. BETANCOURT. *Cubazúcar*, 1960, **5,** (3–5), 15–16.—A brief discussion, with tabular statements, is given of the losses incurred after cutting under the headings of delay before grinding and included extraneous matter.

* * *

The Louisiana sugar cane variety census for 1960. L. P. HEBERT. *Sugar Bull.*, 1960, **38,** 270–273.—The census results are given in both tabular and diagrammatic form. The leading variety, CP44–101, shows little change at 48% from the previous year, as also N:Co 310 at 21%. The third main variety CP36–105, at 10·3%, shows a slight reduction.

[1] 1960, **52,** 9–112.

Ripper Tines
Exceptionally strong, for breaking up subsoil to a depth of 15 ins.

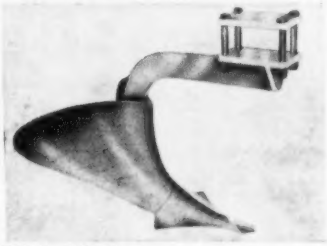


Trenching Bodies
Have adjustable mouldboards for widths from 30 in. to 45 in. and depths up to 24 in.

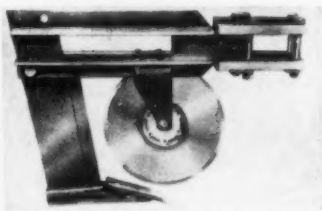
TOOLS FOR THE TOUGHER JOBS

Designed for use on sugar cane and other plantations, these heavy-duty tillage tools have been specially introduced for attaching to the standard toolbars of the more powerful tractors. They will give first-class service under strenuous conditions and the range covers tools for subsoiling, cultivating, ridging and trenching. Owners of suitable tractors will find them invaluable for a wide variety of operations.

Write for illustrated literature of these and of Ransomes share and disc ploughs, cultivators, toolbars, disc harrows, subsoilers, mole drainers, ridgers, potato diggers, combine harvesters, maize shellers, peanut thrashers and shellers, sprayers and driers.



Ridging Bodies
With fixed mouldboards 28 in. wide and 19 in. high.



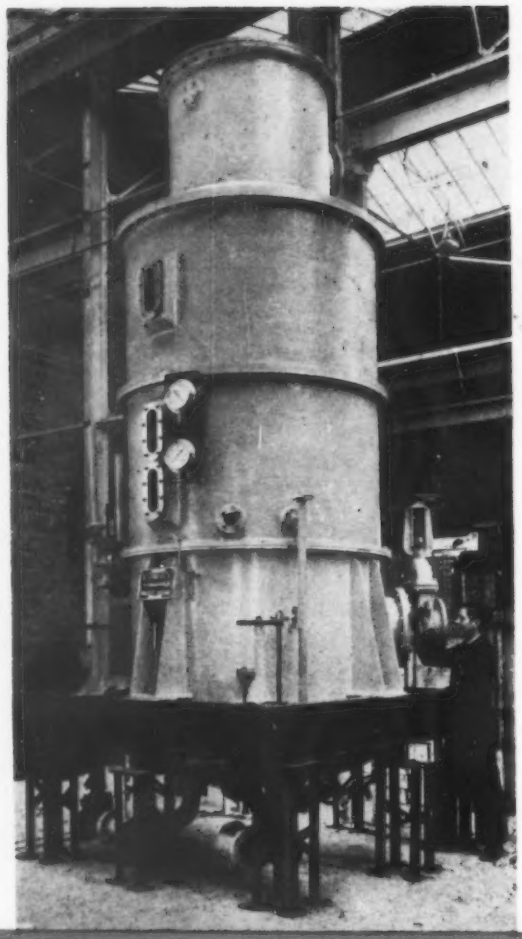
Subsoilers or Mole Drainers
Standards in two sizes, 8 in. × 1 in. and 6 in. × 1 in. section, with fixed or swivel adapter, and with or without disc coulter. Depth of work up to 22 ins.
Adjustable depth wheels can be supplied

Ransomes

Famous throughout the world for agricultural machinery

DISTRIBUTORS IN MOST COUNTRIES

RANSOMES SIMS & JEFFERIES LTD. · IPSWICH · ENGLAND



Evaporators by

*CRAIG

*** manufacturers of machinery for Complete Sugar Factories**

This illustration shows a sugar factory in India. The complete mechanical equipment for this factory was supplied by Craig.

Your enquiries will have our prompt attention.

A. F. CRAIG & COMPANY LIMITED

Head Office and Works: Caledonia Engineering Works, PAISLEY, SCOTLAND
Telephone: Paisley 2191 Telegrams: Craig, Paisley
London Office: 727 Salisbury House, London Wall, E.C.2 Telephone: National 3964

AGRICULTURAL ACTIVITIES IN LOUISIANA

AMERICAN SOCIETY OF SUGAR CANE TECHNOLOGISTS' MEETING, JUNE 1960

MEMORIES of the diastrous set-back caused to the sugar cane industry in the mid-1920's by mosaic have not yet been forgotten in Louisiana. The control of the disease obtained by the development of resistance was sufficiently complete to reduce it to a position of relatively minor importance and to the extent that susceptible varieties such as N:Co 310 and CP 52-60 were released. Recently a new strain of mosaic has been identified and the disease is again assuming major economic importance. Unfortunately, extant varieties resistant to the new strain lack the desirable agronomic characters, and rogueing fields from which seed cane is drawn is the only present practical control, and an expensive one. Cooperative studies were undertaken by E. V. ABBOTT and his associates and those dealing with the mosaic-vector complex; they are described by L. J. CHARPENTIER.

The problem was not simple for, besides the five insects recorded as vectors, ants enter into the picture through their offering protection to aphids in return for the honey-dew secreted. Comparisons of insect populations in two areas of CP 44-101, the one heavily and the other lightly infected, gave the following results expressed as total insect counts of five observations between May 14 and July 1—heavily infected area first: rusty plum aphis (*Hysteroneura setariae*) 34 and 4, sharp nosed grain leaf hopper (*Draeculacephala portola*) 125 and 83, ants (*Iridomyrmes humilis*) 142 and 49. The last named leaf hopper is most suspect from its habitat in the central whorl of the cane stalk; it is also the only known vector of chlorotic streak. The experiment was repeated in 1959 with N:Co 310 with the results in the same order, heavily infected areas first; corn leaf aphis 266 and 129, rusty plum aphis 759 and 80, sharp nosed grain leaf hopper 885 and 623, ants 4135 and 854. It is of interest that, in the heavily infected area, infection had reached 43% in first stubble but only 1·9% in the second stubble of the lightly infected area.

Vector control by chemical means has been under test since 1953 and is broadly described; owing to the variation in the degree of infestation in the several trials, however, the results are not readily summarized. Equally difficult would it be to summarize the survey of vector distribution on plants of other species associated with cane. Johnson grass appears to be leading as alternative host of the corn leaf, and sedge (*Andropogon sp.*) of the rusty plum aphis, but the former has never been shown to carry the virus itself.

The control of Johnson grass is the subject of an article by L. L. ARCENEAUX and it covers work on the Smithfield Plantation of which he is manager. Fallow ploughing with spring smother crops, commenced in 1953, was promising but not entirely satisfactory. In 1956 fall planting of Alba Clover, between mid-October and mid-December after ploughing out stubble, was introduced. By May or early June the clover dies down to form a close blanket still further checking grass growth. Selected land with little grass is sown to beans, providing baled fodder for cattle. After cutting, the land is cultivated and rows laid off for fall planting of cane. All headlands are chopped and harrowed. Railroads are sprayed annually and stubble, where infected with grass, is sprayed two or three times with a somewhat complex mixture of chemicals, usually after stubble shaving.

Of the two further papers one, by C. C. GAUTHIER, describes the 4-H cane project designed to develop in youth an interest in the land, and a lasting and satisfying attitude towards life in the community. The project is described in considerable detail. The second, by M. T. HENDERSON, forms a general view of cane breeding from its commencement stressing, in particular, the rôle played by the range of *S. spontaneum* varieties used in breeding the canes commonly grown in Louisiana.

H. M.-L.

AGRICULTURAL ABSTRACTS

Sugar cane breeding at Canal Point, Florida, 1959/60. P. H. DUNKELMAN. *Sugar Bull.*, 1960, **38**, 273–276.—A brief account is given of the seedlings raised, primarily with the object of securing disease resistance. At greater length is described a new technique for controlling arrowing. Track-mounted carts are used to run the plants under shelter on the greenhouses.

* * *

Dirty cane costs Hawaii $11·02 per ton of sugar. E. C. WATT. *Cane Transport News*, 1960, **3**, (3), 1, 3.—Mechanization in the field has raised the problem of dirty cane which, in its turn, has involved the installation of expensive cleaning plants at the mill. A system for handling hand-cut cane is briefly described.

* * *

Varieties of sugar beets. *Nat. Inst. Agric. Bot. (Cambridge), Farmers' Leaflet No. 5, 3 pp.*—This leaflet is issued to help British sugar beet farmers to choose between the varieties of sugar beet available. It includes only those varieties that are recommended by the National Institute of Agricultural Botany, (in co-operation with the British Sugar Corporation) as a result of their behaviour in recent trials. The main features of each variety—yield, sugar content, tendency to bolt etc.—are given.

Sugar cane in Tanganyika. *Ann. Rpt. Dept. Agric. Tanganyika*, 1959, 9–10.—The main producer of sugar is the Tanganyika Planting Company's estate at Arusha Chini near Moshi, where some 8,500 acres are under cane, an increase of 1,500 acres. In Bukoba the Bhagwani Plantation now has about 2,400 acres, although yields are not high owing to low rainfall (30–35 in). An irrigation system is proposed. At Turiani in Morogoro District a sugar estate is being developed and a pilot factory established. Two farms at Sanje in the Kilombera area continue to plant cane in the hope that a sugar factory will be built at Ruaha. In the meantime jaggery is being produced, as it is in certain other areas—mainly for sale to sisal estates.

* * *

Chemical control of weeds on sugar estates in Java. J. RUINARD. *Neth. J. Agric. Sci.*, 1960, **8**, 34–38.—A comparison was made of the application of herbicide before and after the making of furrows for planting cane, the former giving the better results. A surface application, immediately before furrowing, of a mixture of 20 kg TCA and 2 kg of the ammonium salt of 2,4–D per hectare was used. This stopped weed growth for two months.

* * *

A preliminary study on weed control in sugar cane crop and accelerating cane germination. K. R. KULKARNI. *Mysore Agric. J.*, 1959, **34**, 77–81.—Improved germination resulted from dipping planting setts in "Aretan" (phenyl mercuric acetate) at 1 lb/40 gal and spraying twice before germination with "Fernoxone" (Na salt of 2, 4–D) at the rate of 1½ lb a.e. per acre. This controlled both broad-leaved and grassy weeds.

* * *

Sugarcane pyrilla control by aircraft in Pakistan. H. M. ABBAS, A. AZIM and S. G. SHABBIR. *Agric. Pakistan*, 1959, **10**, 339–350.—By spraying 19·5% "Endrin" e.c., 1 gal to 10 acres, from aircraft at a low height with the crop not too thick, successful control of pyrilla (*Pyrilla perpusilla*) in the nymphal stages was obtained. Cost of the treatment was Rs. 5 per acre. Yields increased as did sugar recovery rate, from 7% to 9·5%.

* * *

Optimum water and manurial requirements of sugarcane on Ghataprabha left bank canal. K. R. KULKARNI. *Mysore Agric. J.*, 1959, **34**, 25–27.—Over a four year period 200 lb N per acre, as against 100 lb per acre, increased the yield of cane by 6·29 tons; the fertilizer used was a mixture of ammonium sulphate and groundnut cake.

Preliminary study on the varietal resistance of standing cane to pineapple disease and the influence of the disease on juice quality. N. J. ASHMED. *Madras Agric. J.*, 1960, **47**, 8–15.—The variety Co 658 was found to be the least susceptible to pineapple disease (*Ceratostomella paradoxa*) of five varieties tested, the other varieties being Co 419, Co 449, Co 527 and Co 1001.

* * *

The effectiveness of phosphoro-potassium fertilizers for sugarcane grown in irrigated grey-soil regions in the southern part of Central Asia. V. P. TETERIN. *Dokl. Akad. Nauk Tadzh. S.S.R.*, 1959, **2**, 45–9; through *Hort. Abst.*, 1960, **30**, 380.—Application of P or P-K fertilizer, in addition to a basic dressing of N, counteracted the adverse effect of N on the sugar content of the cane, increasing it by 4·1–11·6%. P and P-K also increased yield and quality. An N : P : K. ratio of 150: 250: 200 has been successfully used in breeding and selection centres.

* * *

When to irrigate sugarcane and how many times. J. G. SHRIKHANDE and H. P. VERMA. *Ind. Farming*, 1959, **9**, 11–13.—Increasing pre-monsoon irrigations from three to six resulted in a 12·6% higher yield. After April the maximum permissible period between irrigations was 20 days. Post-monsoon irrigation was only beneficial in seasons of deficient rainfall, otherwise it caused delayed maturity and lower sugar content. Mulching with sugar cane trash or paddy husk was very beneficial where irrigation was inadequate. The most drought resistant varieties were Co 453, CoS 321 and CoS 510.

* * *

Scientific research and progress in the sugar industry: the Portuguese aspect. J. CUNHA DA SILVEIRA. *Agros*, 1959, **42**, 387–400.—Accounts are given of sugarcane cultivation and sugar production in Mozambique, Angola and other countries.

* * *

The value of ammoniated sugar beet pulp for dairy cows. W. H. BROSTER *et al. J. Agric. Sci.*, 1960, **55**, 197–202.—This work, carried out at the National Institute for Research in Dairying, Shinfield, Reading, is to test the belief that the nitrogen added during ammoniation could be converted to protein by the rumen microflora in a manner similar to the utilization of urea. It was concluded from the feeding trials that the nitrogen added to sugar beet pulp during ammoniation could be utilized by milking cows, but the experiment did not permit an estimate of the efficiency of utilization.

RECIRCULATION OF OVER-SATURATED PRE-LIMING SLUDGE CONCENTRATE

A New Method of Juice Purification

By S. WRAMSTEDT
(Swedish Sugar Corporation)

Paper presented to the 13th Technical Conference of the British Sugar Corporation Ltd., 1960; *also* Socker Handlingar II, 1960, **16**, 1–5.

IT is now some 15 years since interest was aroused in the Swedish Sugar Corporation in the methods of continuous juice purification by which the heavy manual labour required for the first carbonatation filter presses could be eliminated. Since then, the Dorr method has been tested but not adopted. The Wiklund method, which comprises the recirculation of over-saturated first carbonatation sludge juice to pre-liming, has been tested and adopted in several factories. For a few years now, a couple of factories have recirculated sludge concentrate from the first carbonatation thickener to pre-liming. It is the purpose of all these methods to endow the first carbonatation sludge with properties such that it will easily settle in a thickener and will subsequently be filterable on rotary vacuum filters. They have given the desired results in these respects.

The processing methods adopted have also given fairly satisfactory results with regard to the quality of the juice. However there still remained one or more theoretical objections to the above methods from the point of view of juice quality, and further improvements of the juice purification techniques consequently appeared desirable.

At the Sugar Technical Laboratory we therefore, during 1958, began to develop a method of juice purification based on some important principles

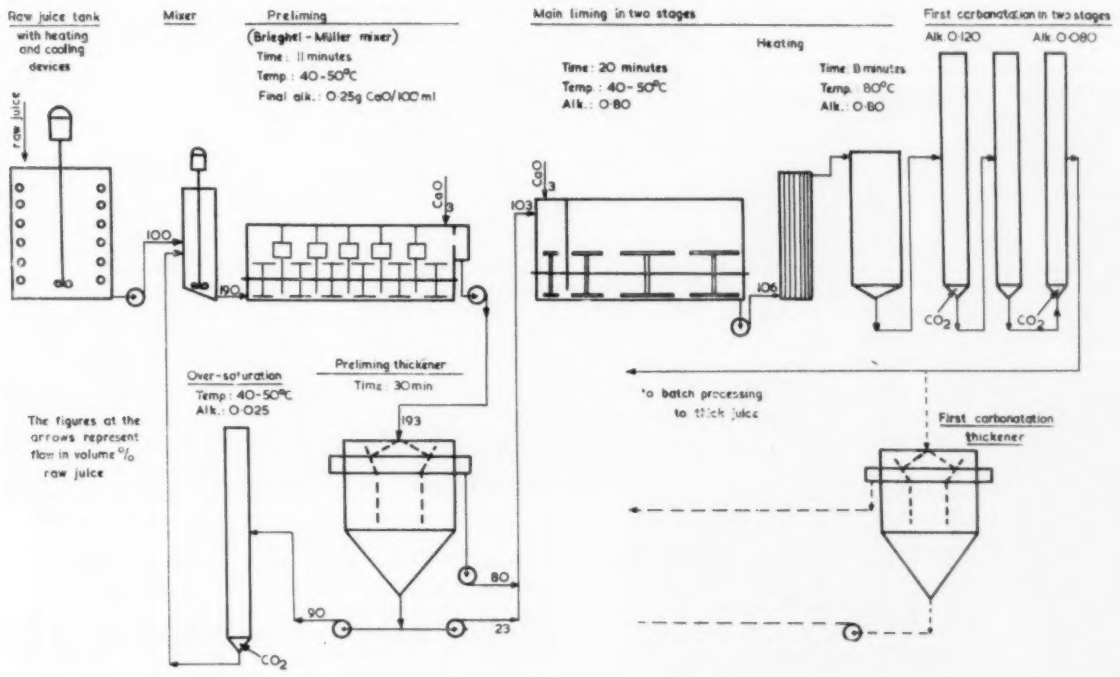


Fig. 1

which, in our opinion, should not be abandoned, at least at present. These principles are based on theoretical considerations and on the SSA's experience of juice purification in factory conditions and in experimental plants; they may be expressed as follows:

(1) Progressive pre-liming should be applied, and the basis of good sedimentation and filtration properties of sludge juice is thereby laid down.

(2) The pre-liming should be "cold," i.e. it should be carried out at 40–50°C, because high pre-liming temperatures give inferior juices. It should be possible to use a temperature as low as 25–30°C in order to permit raw juice from the Danish trough diffusion system to pass directly to the pre-liming station.

(3) Main liming should be applied, as the stability of the purified juice with regard to colour formation depends on the fact that the invert sugar has been wholly decomposed.

(4) It should be possible to use "cold" main liming, i.e. to use the same temperature as that employed for the pre-liming, as there is then less formation of colour with invert sugar decomposition. The final stage of the main liming may be "hot" in order to avoid over-long retention times and still achieve complete decomposition of the invert sugar.

(5) The main liming should be carried out at high alkalinity, this too for reasons connected with colour formation. As much as possible of the lime should consequently be added in main liming. Dilution, by recycled juice, of the juice that is to pass to main liming should be avoided.

(6) The sludge should not undergo the drastic conditions of main liming more than once in order that the risk of decomposition of sludge and consequent deterioration of the juice quality may be reduced to a minimum.

(7) First carbonatation should be continuous and performed so as to yield juice of the highest possible quality.

(8) Appreciable quantities of hot sludge juice should not be recycled to pre-liming for reasons mentioned in points 2, 4, 5 and 6 but also for reasons of heat economy. The possibility of heating the juice by means of low-grade steam should be retained.

(9) Recirculation of over-saturated sludge juice to pre-liming, according to the Wiklund method, has proved to yield satisfactory sludge in first carbonatation. Some type of over-saturation should therefore be included in the system.

The method of juice purification that gradually took shape from these ideas was tested in an experimental plant during the 1958 and 1959 campaigns. The capacity of the plant was approximately 500 litres of raw juice per hour with normal operation. Fig. 1 shows the arrangement of the plant and the juice purification system that was found to yield the best results. The continuously-produced sludge juice from the first carbonatation was periodically processed to thick juice by filtration, second carbonatation, filtration, sulphitation, filtration and vacuum evaporation. The thick juice was analysed. The amount of lime used for juice purification was such that main alkalinity after processing without any recirculation at all would have been 1·1 g CaO per 100 ml. In the conditions prevailing in Sweden this figure corresponds to 3·3% of limestone on beet or 1·7% of burnt lime on beet.

The experimental results were judged, with respect to sludge quality, by the filtration coefficients (F_k I) of the prelimed juice and of the first carbonatation sludge juice, by their sedimentation velocities (S) and by the sludge volumes (V) after a sedimentation time of 25 minutes. The quality of the juice was judged according to the colour, the colour quotient, lime salts, and invert sugar content (determined according to the Berlin Institute method) of the thick juice.

The colour of the thick juice is measured at two wavelengths and expressed as one thousand times the extinction coefficient (a) of a layer 1 cm thick of juice of concentration 1 g dry substance per ml. The colour designated as $1000a_1$ is measured with a filter having a transmission peak at 463 mμ and $1000a_2$ is measured at 615 mμ. If the value of the colour a_1 is divided by that of a_2 we obtain the so-called colour quotient; it is an index of the quality of the juice and should have as high a value as possible. Before determining the colour, the juice is diluted to 30°Bx, adjusted to pH 7·0 and passed through a fine glass filter.

Unfortunately, there is no internationally accepted standard method of colour determination. It is consequently impossible to compare the Swedish Sugar Corporation's colour analyses directly with the results obtained by other sugar manufacturers. We have therefore converted our colour values to the units used in Britain, Germany and in Denmark. The conversion was based on the methods used in these countries and on the theory of colour determination. The colour of a number of juice samples was determined in the British Sugar Corporation, in the Institut für landwirtschaftliche Technologie und Zuckerindustrie in Braunschweig (the Institute of Agricultural Technology and Sugar Industry in Brunswick), in De danske Sukkerfabrikker (the Danish Sugar Corporation) and in the Swedish Sugar Corporation; in this way the conversion results could be checked. Our thanks are due to Mr. PARKER, Professor SCHNEIDER and Mr. LOFT for their help in the comparison of the analyses.

Investigation of juice purification was carried out in experimental plant at the Skivarp factory in 1958 and at the Hököpinge factory in 1959. At Skivarp the raw juice was produced in a diffusion battery, and the quality of the beets was good that year. The beet quality was not so good in 1959 at the Hököpinge factory (which has a Buckau-type tower diffuser); the beets had a high content of noxious nitrogen, caused by the extremely dry summer and autumn weather, and the invert sugar content

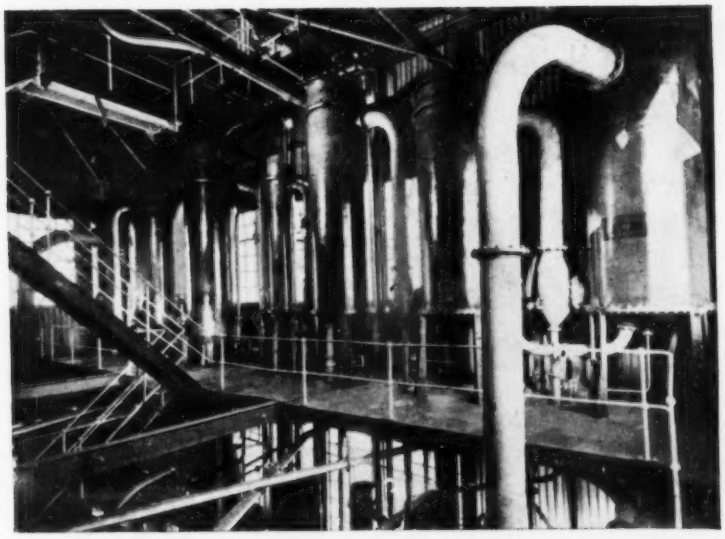
BLAIRS

COMPLETE

SUGAR

FACTORIES & REFINERIES

DISTILLERIES, ABSOLUTE ALCOHOL & CHEMICAL PLANTS

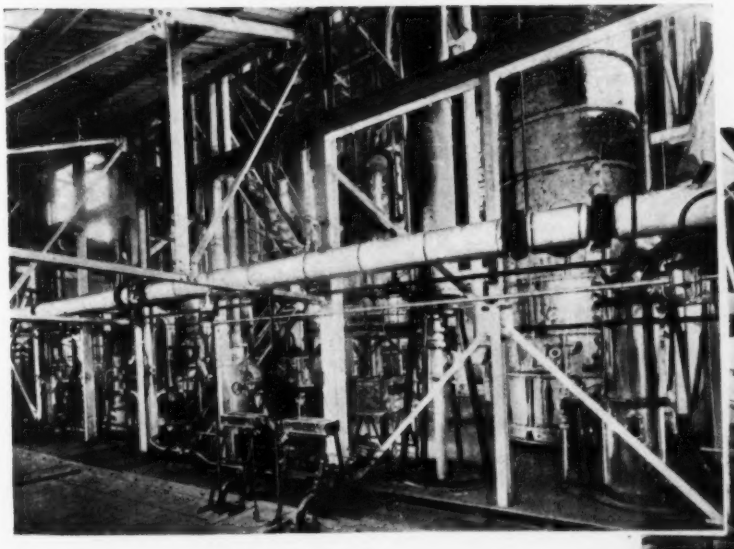


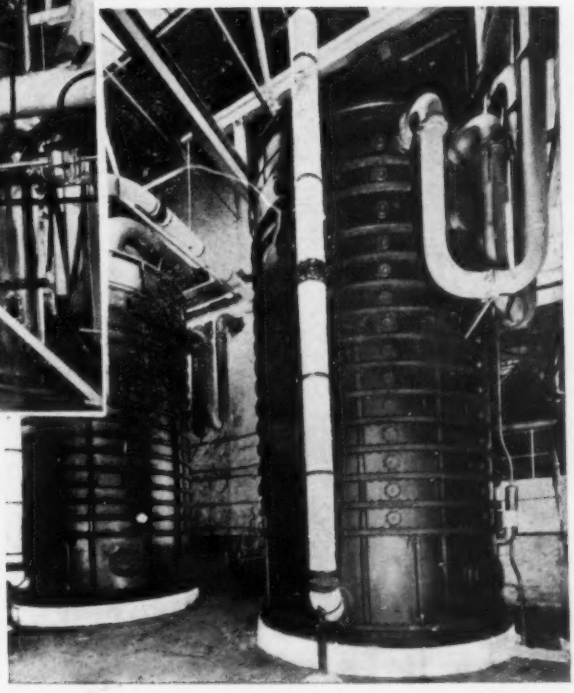
Our illustrations show, on three floors, parts of two Continuous Steam Stills designed to treat molasses wash.

LEFT (UPPER) ..... TOP FLOOR

LEFT (LOWER) ..... MIDDLE FLOOR

RIGHT (LOWER) ..... BOTTOM FLOOR





Sole Makers of
MULTIPLEX FILM EVAPORATORS

BLAIRS LIMITED

WOODVILLE STREET · GLASGOW, S.W.1

Cables : "BLAZON, GLASGOW"

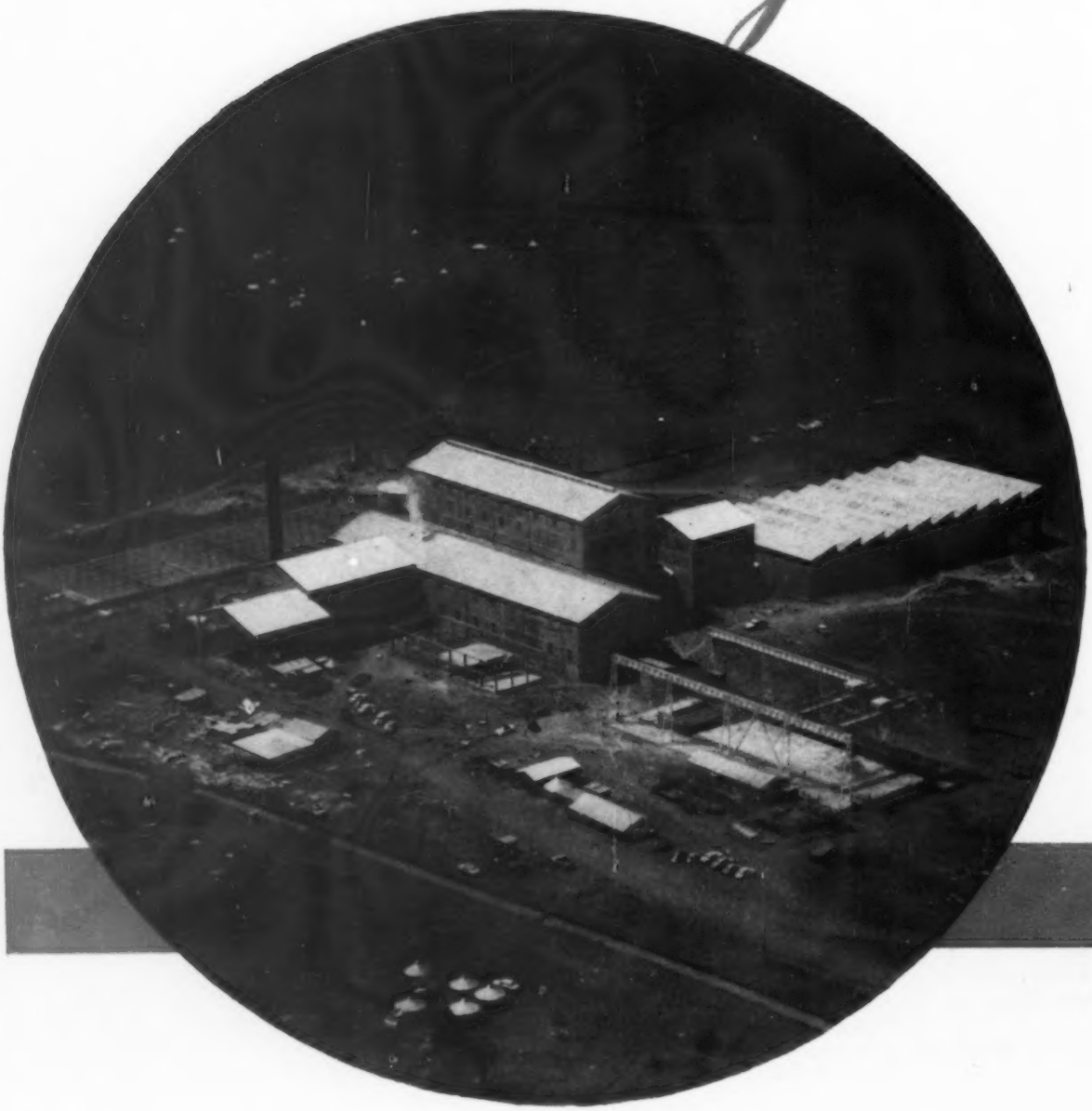
London Office: **38 Grosvenor Gardens, S.W.1**

Cables : "*Multivap, Sowest, London*"

SMITH

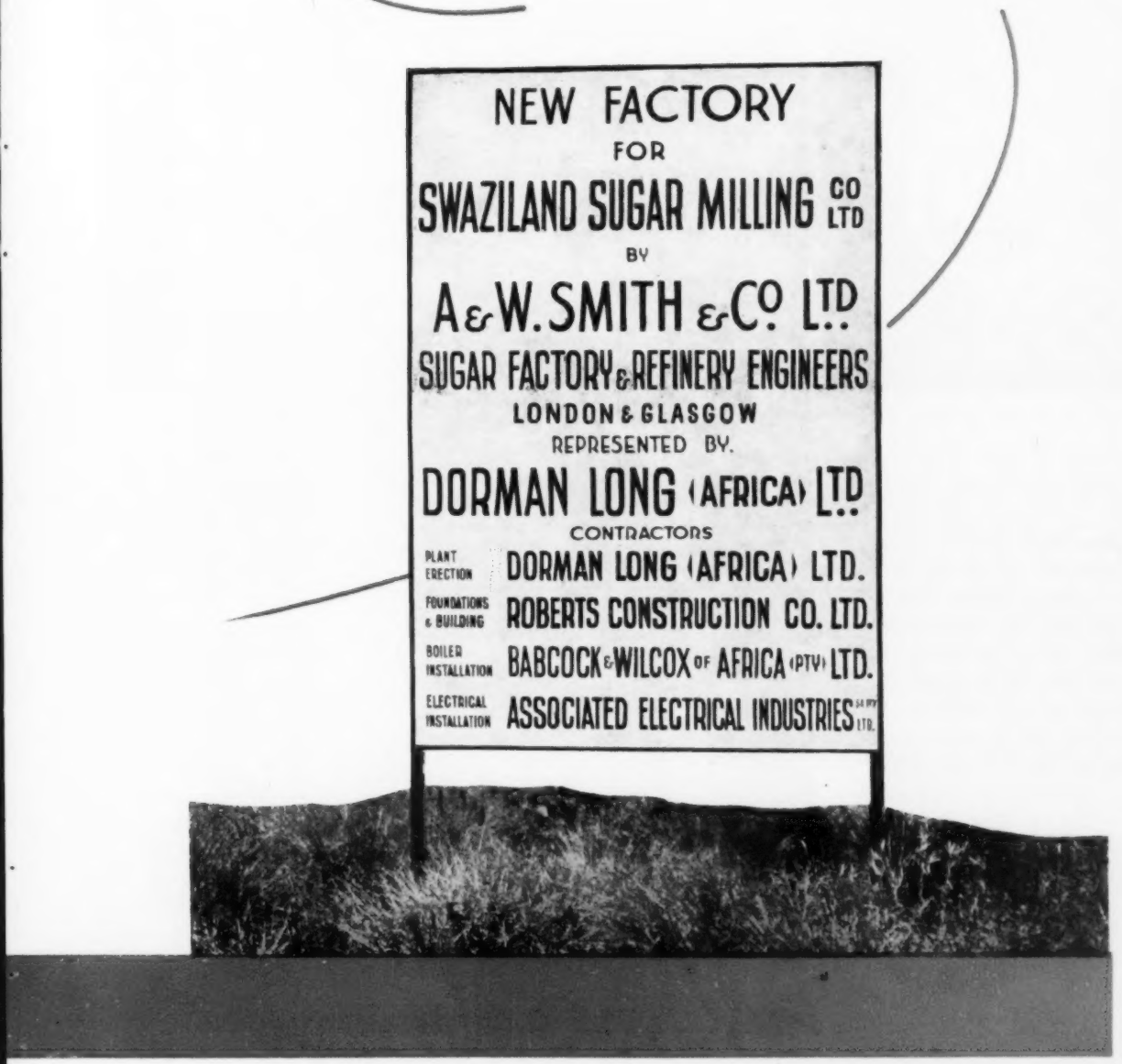
SUGAR

Machinery



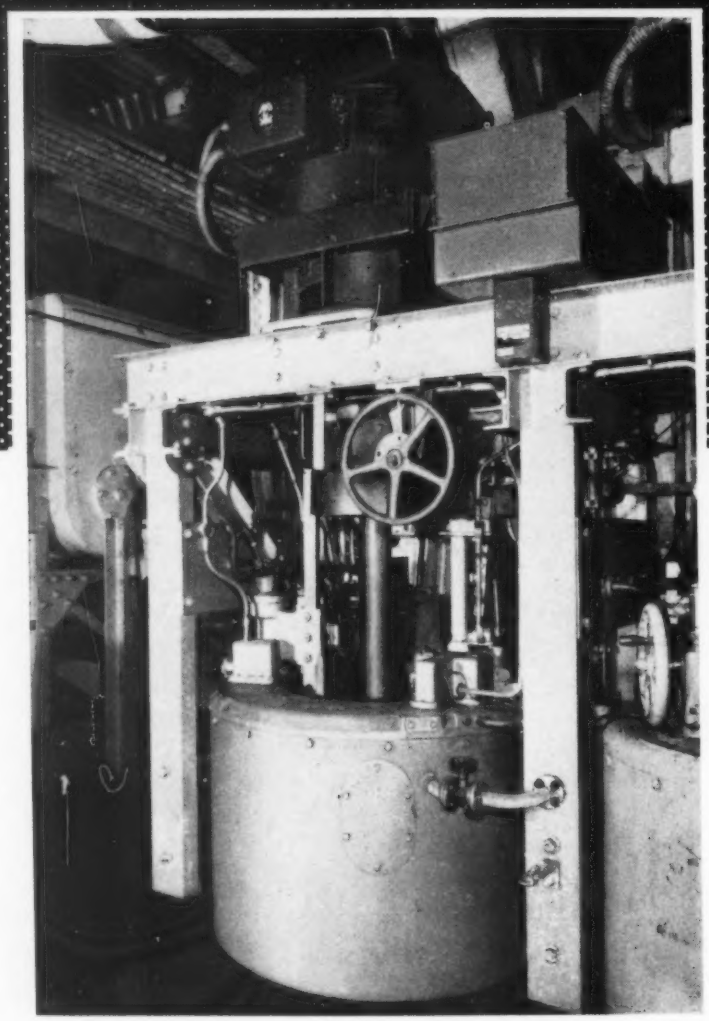
PROCESS:

Simple Defecation System will be used for Clarification of the Cane Juice in manufacture of Raw Sugar. A portion of the Raw Sugar will be melted and treated by Single Continuous Carbonatation and Filtration followed by slight Sulphuring and Second Filtration prior to Boiling for White Sugar. CO_2 for Carbonatation will be drawn from the Boiler Flue Gases.



INITIAL GRINDING RATE: 75 Tons of Cane per Hour.
FUTURE GRINDING RATE: 120 Tons of Cane per Hour.
OUTPUT: 25% Raw Sugar, 75% Refined White Sugar.

FULLY AUTOMATIC CENTRIFUGALS



Our latest design of Fully automatic Centrifugal gives complete automation in centrifuging. There are no labour training problems; no allowance is necessary for human error. Each phase of the cycle can be preregulated for the type of sugar being cured.

POTT, CASSELS & WILLIAMSON LTD.

A Member of The Mirrlees Watson Group

Motherwell Lanarkshire Scotland

Cables: Pott, Motherwell

was also at times considerably above normal. Furthermore, the raw juice at Hököpinge contained more pectin than is usual in a battery factory. These circumstances must be taken into account in judging the results.

Table 1 shows the properties of the sludge in the pre-limed juice and the first carbonatation sludge on operating the plant according to the schedule shown in Fig. 1. The pre-limed juice does not have a high sedimentation rate, but a retention time of 30 minutes in the pre-liming thickener has proved sufficient. It should also be pointed out that on using this method the draught at the bottom of the thickener is larger than the clear juice draught. Furthermore, the clear juice need not be perfectly free from sludge, as it will in any case be mixed with sludge concentrate before main liming takes place. These two factors decrease the need for high sedimentation qualities of the juice. The experiments have also shown that raw juice with a high Brix (about 17°) has inferior sedimentation qualities in comparison with a juice of 14–15°Bx.

The F_k, S and V values of the first carbonatation sludge juice are quite sufficient for continuous juice purification, i.e. thickening and filtration on vacuum filters.

Table 2 shows the properties of the thick juices. The values of the juice colour are low, and some experiments with straight juice purification in the experimental plant demonstrated that recirculation in the pre-liming system did not cause any deterioration of the juice colour at all. In this connexion it should be mentioned that sulphitation was employed only to such an extent that the thin juice after sulphitation showed a weak alkaline reaction as determined bv a phenolphthalein indicator at 95°C.

The thick juice showed a higher percentage of lime salts in 1959 than in 1958, but this fact must be ascribed entirely to the quality of the beets. The same is the case as regards colour. The invert sugar content is low, which is as it should be, in our opinion. The thermal stability should otherwise have deteriorated and this, naturally, was not desirable. These was also the risk that in view of the gentle vacuum evaporation practised in our experiments we might have obtained results leading to erroneous conclusions.

The juice purification method herein described, allows many variations to be made, which is one of its main advantages. Several of the variants have been tested and two of them are briefly described below.

As shown in Fig. 1 and Table 1 the method permits the pre-liming sludge to be removed before the main liming. This was tested and in 1958 the quality of the thick juice improved if the sludge was removed. In 1959 the effect was insignificant. These results, combined with the fact that addition of lime sludge to the "betfor" (molasses-dried beet pulp) is not practised in Sweden, explain why the experiments were not continued. From the technical point of view, however, the method might well bear comparison with, for example, the "Sepa" process.

In 1959 we also tried recirculating first carbonatation sludge concentrate to the over-saturation and the pre-liming system and removing the sludge together with the pre-liming sludge. This procedure did not have any unequivocal effect either on the properties of the pre-liming sludge or on the quality of the thick juice.

The method of juice purification described above can be applied even at the low temperatures which may occur when the Danish trough diffusion system is used. The quantity of recirculated sludge must be increased if the temperatures in the pre-liming system do not exceed 25°C. Both the pre-liming sludge and the first carbonatation sludge show lower sedimentation rates when these pre-liming temperatures are used (and the decrease is larger than that which may be ascribed to the increased viscosity and higher specific gravity of the juice); this fact must be taken into account in determining the size

Table 1. Filtration and sedimentation properties of pre-limed juice and first carbonatation sludge juice, mean values

Experiments at	*Pre-liming temperature* (°C)	*Pre-limed juice* F_kI	*Pre-limed juice* S (cm/min)	*Pre-limed juice* V (%)	*First carbonatation sludge juice* F_kI	*First carbonatation sludge juice* S (cm/min)	*First carbonatation sludge juice* V (%)
Skivarp 1958	40	4·3	2·0	38	1·2	9·0	17
Skivarp 1958	50	3·2	2·6	32	1·4	9·8	13
Hököpinge 1959	40	11·5	1·1	50	1·4	6·3	20
Hököpinge 1959	45	7·3	1·4	47	1·9	8·5	17

Table 2. Properties of the thick juice, mean values

Experiments at	*Pre-liming temperature* (°C)	*Colour* $1000a_1$	*Colour* $1000a_2$	*Colour quotient*	*Lime salts* $CaO/100\ Bx$	*Invert sugar content* (mg/100 *pol*)	*The colour of the thick juice corresponds to S.A. Index after filtration according to the BSC*	*°Stammer according to the Brunswick Institute**	*°Stammer according to the Danish Sugar Corporation*
Skivarp 1958	40	340	43	8·0	0·018	—	140	3·6	5·0
Skivarp 1958	50	350	51	6·9	0·024	12	150	4·0	5·0
Hököpinge 1959	40	460	97	5·0	0·056	11	230	6·6	6·1
Hököpinge 1959	45	530	99	5·6	0·051	28	250	7·1	7·2

of the thickeners. The duration of pre-liming should also be increased.

In conclusion, it may be mentioned that oversaturation of pre-limed juice at the pre-liming temperature and subsequent recirculation of this juice have been the object of full-scale tests at the Roma sugar factory in 1959. The system did not include a pre-liming thickener, and the full effect could therefore not be obtained. An improvement in the properties of the first carbonatation sludge could be observed, and the test caused no difficulties or disturbances in the processing.

Summarising the above considerations, it may be asserted that the method involving recirculation of pre-limed sludge concentrate which has been oversaturated at the pre-liming temperature, has been proved to yield both very good juice quality and easily workable first carbonatation sludge, as shown on operating an experimental continuous plant.

Mr. G. ANDERSON and Mr. W. ASK have supervised the operation of the experimental plant. My hearty thanks are due to them for their great interest and their accurate work without which these investigations would not have been possible.

REFRACTIVE INDEX OF SUCROSE SOLUTIONS

A Statistical Appraisal

By S. HILL and W. J. H. ORCHARD
(Tate and Lyle Research Laboratory, Keston, Kent.)

TWO recent investigations of the refractive indices of solutions of sucrose, in the range 54% to 81% sucrose at 20°C, provide a basis for a revised refractive index table. The data, given in column 1, 2, 5 and 6 of Table 1, are those of SNYDER[1] and CHARLES[2].

In the practical use of refractive index data the R.I. of a solution is measured and the percentage sucrose (or solids) is derived from it. For this reason the R.I. has been treated in the statistical analysis, as the independent variable.

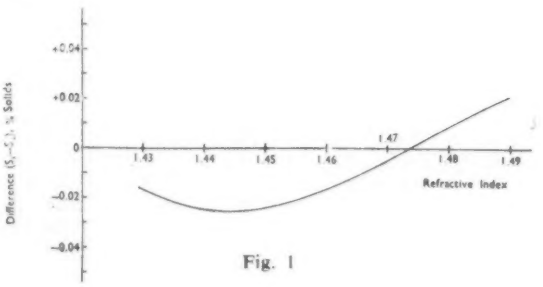


Fig. 1

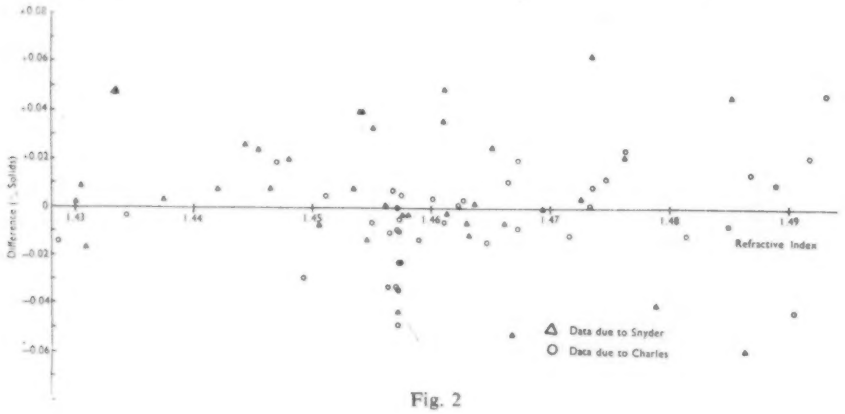


Fig. 2

Regression analysis shows that, when the percentage sucrose (S) is expressed as a polynomial function of R.I. (n), terms up to n^3 are significant in both cases.

The two cubic regression equations are:

$$S_r = -10574{\cdot}22941 + 20128{\cdot}08464\ n - 12880{\cdot}72148\ n^2 + 2799{\cdot}21245\ n^3 \quad \ldots\ldots\ldots(1)$$
(Snyder)

and:

$$S_r = -11949{\cdot}44387 + 22925{\cdot}93415\ n - 14777{\cdot}20943\ n^2 + 3227{\cdot}51123\ n^3 \quad \ldots\ldots\ldots(2)$$
(Charles)

(S = percentage sucrose by weight in air)

[1] SNYDER: *Proc.* 12th *Session ICUMSA*, 1958, 23.
[2] CHARLES: *I.S.J.*, 1959, **61**, 236–240.

Values predicted from these equations appear in columns 3 and 7 of Table 1, and in columns 4 and 8 the experimental deviations (δ) from these values are tabulated. The random distribution of the deviations shows that in neither case would a term in n^4 be significant.

The standard deviations of the differences between observed values and those derived from equations (1) and (2) are:

0·0277% (Snyder)
and 0·0182% (Charles)

These standard deviations are essentially the standard errors of single determinations.

The equation:

$$S_s - S_c = 1375{\cdot}21446 - 2797{\cdot}84951\ n + 1896{\cdot}48795\ n^2 - 428{\cdot}29877\ n^3 \quad \ldots\ldots\ldots(3)$$

is the difference between equations (1) and (2). Differences between the predictions of the two equations, calculated from equation (3), are plotted in Fig. 1.

These differences are of doubtful significance in view of the magnitudes of the standard deviations.

Table 1

Data due to Snyder				*Data due to Charles*			
R.I.	*Observed Solids*	*Predicted Solids*	δ	*R.I.*	*Observed Solids*	*Predicted Solids*	δ
1·43009	54·668	54·662	+0·006	1·42861	53·999	53·992	+0·007
1·43062	54·906	54·907	—0·001	1·43454	56·712	56·720	—0·008
1·43097	55·094	55·068	+0·026	1·44704	62·238	62·271	—0·033
1·43342	56·152	56·189	—0·037	1·44936	63·291	63·274	+0·017
1·43963	58·997	58·987	+0·010	1·45117	64·034	64·051	—0·017
1·44206	60·070	60·065	+0·005	1·45509	65·713	65·717	—0·004
1·44435	61·059	61·073	—0·014	1·45631	66·254	66·231	+0·023
1·44547	61·551	61·563	—0·012	1·45666	66·379	66·378	+0·001
1·44649	62·012	62·007	+0·005	1·45688	66·454	66·471	—0·017
1·44805	62·676	62·684	—0·008	1·45705	66·566	66·542	+0·024
1·45060	63·802	63·783	+0·019	1·45718	66·587	66·597	—0·010
1·45353	65·038	65·035	+0·003	1·45718	66·621	66·597	+0·024
1·45399	65·201	65·230	—0·029	1·45725	66·626	66·626	0
1·45417	65·277	65·307	—0·030	1·45730	66·661	66·647	+0·014
1·45458	65·504	65·480	+0·024	1·45731	66·665	66·651	+0·014
1·45503	65·649	65·671	—0·022	1·45735	66·669	66·668	+0·001
1·45617	66·162	66·152	+0·010	1·45744	66·701	66·706	—0·005
1·45722	66·647	66·594	+0·053	1·45736	66·712	66·672	+0·040
1·45769	66·805	66·792	+0·013	1·45756	66·742	66·756	—0·014
1·45818	67·010	66·997	+0·013	1·45903	67·375	67·370	+0·005
1·46105	68·167	68·195	—0·028	1·46017	67·833	67·845	—0·012
1·46118	68·207	68·249	—0·042	1·46116	68·252	68·256	—0·004
1·46142	68·358	68·349	+0·009	1·46241	68·764	68·773	—0·009
1·46305	69·036	69·023	+0·013	1·46291	68·969	68·979	—0·010
1·46333	69·156	69·139	+0·017	1·46466	69·707	69·698	+0·009
1·46381	69·341	69·337	+0·004	1·46660	70·476	70·491	—0·015
1·46518	69·881	69·901	—0·020	1·46723	70·752	70·748	+0·004
1·46620	70·329	70·319	+0·010	1·46739	70·786	70·813	—0·027
1·46689	70·658	70·601	+0·057	1·47163	72·538	72·528	+0·010
1·46950	71·666	71·664	+0·002	1.47345	73·257	73·258	—0·001
1·47256	72·897	72·900	—0·003	1·47351	73·273	73·282	—0·009
1·47355	73·237	73·298	—0·061	1·47475	73·767	73·778	—0·010
1·47632	74·386	74·407	—0·021	1·47641	74·417	74·438	—0·021
1·47895	75·489	75·452	+0·037	1·48130	76·387	76·371	+0·016
1·48518	77·851	77·904	—0·053	1·48494	77·810	77·795	+0·015
1·48638	78·423	78·373	+0·050	1·48673	78·486	78·492	—0·006
				1·48892	79·340	79·341	—0·001
				1·49031	79·931	79·878	+0·054
				1·49177	80·431	80·440	—0·009
				1·49324	80·970	81·005	—0·035

Table 2

Refractive Index at 20°C	0	0·001	0·002	0·003	0·004	0·005	0·006	0·007	0·008	0·009
1·42	—	—	—	—	—	—	—	—	53·7011	54·1661
1·43	54·6292	55·0905	55·5519	56·0079	56·4639	56·9182	57·3708	57·8217	58·2709	58·7185
1·44	59·1644	59·6087	60·0514	60·4925	60·9319	61·3700	61·8065	62·2414	62·6749	63·1069
1·45	63·5374	63·9664	64·3941	64·8203	65·2452	65·6686	66·0908	66·5116	66·9311	67·3493
1·46	67·7662	68·1818	68·5962	69·0094	69·4214	69·8322	70·2418	70·6503	71·0576	71·4638
1·47	71·8689	72·2729	72·6759	73·0778	73·4787	73·8786	74·2775	74·6754	75·0724	75·4685
1·48	75·8636	76·2578	76·6494	77·0436	77·4353	77·8261	78·2161	78·6053	78·9937	79·3814
1·49	79·7683	80·1545	80·5400	80·9249	—	—	—	—	—	—

Moreover the coefficients in the two regression equations do not differ significantly from each other. We may treat the two equations as having equal status and form the mean equation:

$$S = -11261{\cdot}83664 + 21527{\cdot}00940\ n - 13828{\cdot}96545\ n^2 + 3013{\cdot}36184\ n^3 \quad \ldots\ldots\ldots(4)$$

Equation (4) is perhaps the best estimate that can be made at present of the relationship between refractive index and percentage sucrose in the range of R.I. extending from $n = 1{\cdot}428$ to $1{\cdot}493$. It must not be extrapolated beyond these limits.

The differences between the experimentally determined values of percentage sucrose and those calculated from equation (4) are plotted against R.I. in Fig. 2. It is clear that the deviations are randomly distributed. The standard deviation is 0·0244 % sucrose.

Table 2 shows values of percentage sucrose calculated from equation 4 for refractive index increments of 0·001.

THE PLAISTOW RECOVERY HOUSE

By COLIN LYLE
(Tate & Lyle Ltd.)

PART II

The evaporator station consists of two principal systems: four multiple-effect evaporators and a number of vapour users. Fig. III is a simplified diagram of the station. The evaporators concentrate Fine Liquor, Jet 2, Sweet Water and Syrup Process Lights, the first two in double-effect, the second two in triple-effect. Steam at 15 p.s.i. is fed to the calandrias of the 1st effects; wherever worthwhile, 1st effect vapour is bled off to preheat their feeds. The vapour users absorb bled or surplus 1st, 2nd or 3rd effect vapour: mingling syrup and carbonatated liquor are entirely heated in this way and all water used in the process is heated by vapour from 15 to 85°C. Two flash vessels, for cooling brown liquor before charring and fine liquor before storage, contribute some vapour to the system.

There are thus 13 evaporator bodies, all a standard 6 ft dia. by 16½ ft high, 8 with 2000 sq. ft. and 3 with 1500 sq. ft. calandrias. For the heavier duties—fine liquor and sweet water—two bodies piped in parallel form the 1st effects. This concentration of all evaporating plant in one station provides the best chance of avoiding a surplus of vapour and there is only one high vacuum condensing system for the station; the heat in the vapour discarded in the river water condenser is 11% of the heat in the input steam.

All steam consumed in the Recovery House is at 15 p.s.i. Our high pressure process main is at 70 p.s.i. and a steam accumulator is placed between the two mains. To take full advantage of this pressure drop two water stills have been installed in the building, one having 70 p.s.i. steam to its calandria and boiling off into the accumulator inlet pipe, the other taking steam from the accumulator and boiling off into the 15 p.s.i. main. This, with the collection of other condensate, normally provides the steam boilers with a feed of 100% distilled water.

All plant in the building has been laid out to help the weighing and sampling of inter-process materials. With Servo-Balans scales to weigh them and watershed arrangements to keep overflows within their own processes, we are equipped to obtain constituent balances across each process. It is believed that measuring sugar loss is the precursor to preventing it.

The costs of all the plant and building may be split as follows:

	%
Affination	19
Recovery	45
Carbonatation and Filtration	24
Evaporator Station and Steam plant	12
	100

Instruments, automatic valves and controls cost 9% of the total plant cost.

Fig. IV shows a typical cross-section of the building and plant.

The Performance of the Plant

Transfer of some secondhand plant and all functions to the new building and the start-up of much automatically controlled plant was a lengthy and untidy business. However, performance has now well justified most of the design, with some exceptions to be discussed later. Table I shows the principal comparisons of technical performance between old and new plant.

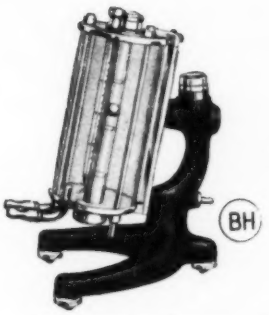
In most respects we have obtained substantial improvements. The colour removal by carbonatation looks poorer but the input colour is less, defecation is actually excellent and the precipitate's porosity has much increased; we are much less troubled by poorly filtering raws than before.

We are delighted with the efficiency and reliability of the affination centrifugals but the mingling syrup circuit has proved difficult to control—as shown by the still high quantity of raw syrup—and requires a modification in principle. We now find that the syrup is saturated with sucrose where previously it required concentration if solution were to be avoided in the mingler. We intend to change its evaporator to a simple heater.

The recovery station has saved much steam and excess sugar in molasses. Pans have performed well and provide good circulation but the mushroom-type discharge valves hinder the run-off of heavy massecuites and the planned "heavy boiling" of 1st Crop

Suma Products

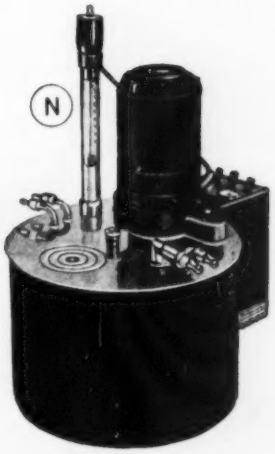
VISCOSITY MEASUREMENT



For the study of viscosities of sugar-house products, the **HÖPPLER VISCOMETER (Type BH)** is both accurate and rapid in operation. This instrument has a range of 10 to 1 million c.p. with an accuracy to within ±0.5% of the true value. There is no error due to surface tension, evaporation, skin formation or retention of fluid residues within the measuring chamber. It operates from —60°C to 150°C, is electrically heated and suitable for 100/110 V. or 200/250 V. A.C., 50 or 60 cycles.

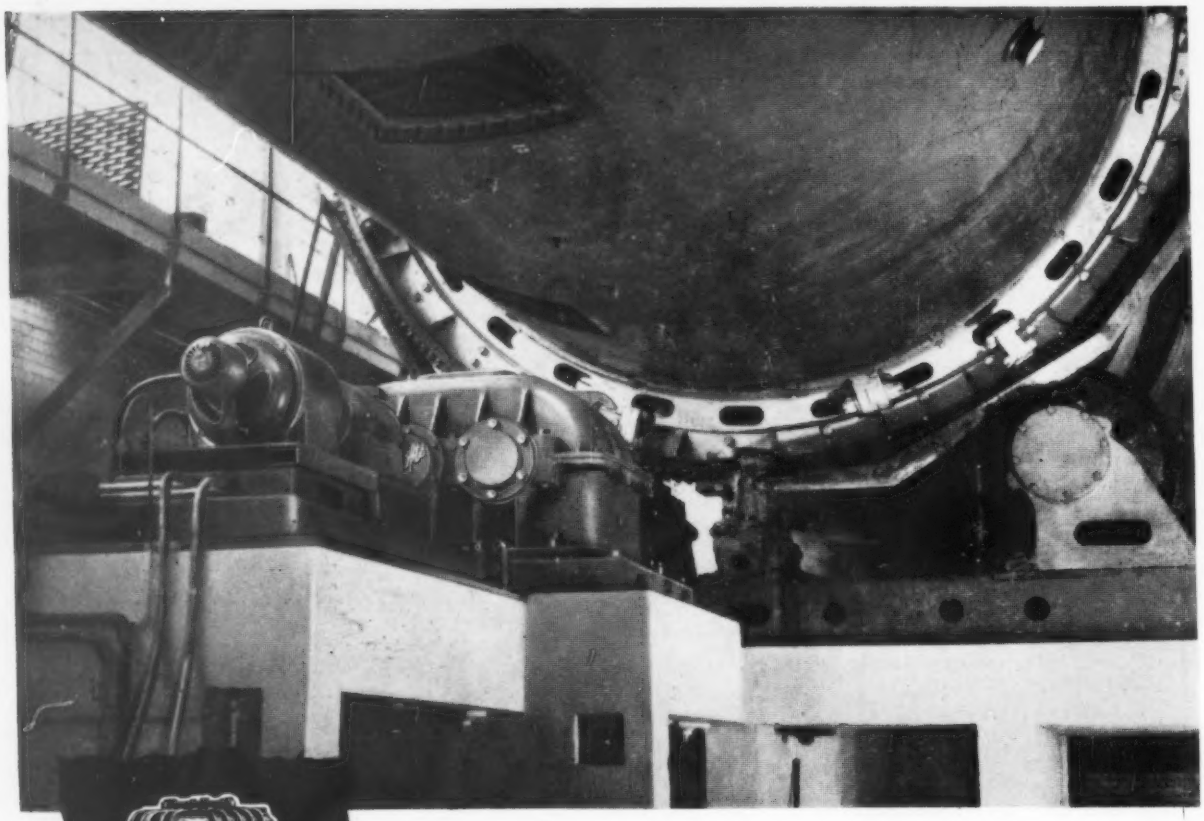
Thermometer Ranges. **0·1°C. subdivisions :** —1 to 26°, 24 to 51°, 49 to 76°, 74 to 101°C.
0·5°C. subdivisions : —1 to 55°, 50 to 100°, 100 to 150°C.

For the supply of a constant-temperature source of water to the Höppler Viscometer Type BH, as well as to instruments such as refractometers, etc., the Ultra thermostat (Type N) may be used with advantage. The content of the tank is 7 litres and the temperature control can be regulated to within ±0.01°C. It is fitted with an efficient self-starting squirrel cage motor (or Universal motor, if required) and is quiet in operation. Three heating stages are available (500, 700 and 1200 watts) so that only a short heating-up period is required. The thermostat is suitable for voltages of 110 or 220, 50 or 60 cycles, single-phase alternating current.



Write now for details of our complete range of equipment.

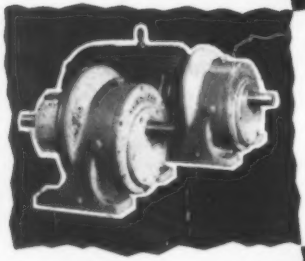
The Sugar Manufacturers' Supply Co. Ltd.
7 & 8, IDOL LANE, LONDON, E.C.3, ENGLAND.
Cables : "Sumasuco, London."



SPIRAL BEVEL GEARS
Publication 549

it's not just a matter of a pinion...

UNIVERSAL MOUNTING WORM GEARS
Publication 571



RITESPEED GEARED MOTORS AND REDUCTION GEARS
Publication 5737A

. . . although CROFTS gears do incorporate nickel chrome steel pinions of 55/60 tons tensile strength. CROFTS helical gear units offer so many other advantages as well; phenomenal toughness, enhanced durability, greatly reduced shock-loading and noise, minimal abrasion in service. They simplify and speed production, and provide cheaper power.

And that's not just a matter of opinion. CROFTS helical gears are proving all this in every continent of the world today.

(If helical gears interest you, you'll probably want to know, also, about the other CROFTS gears shown on this page.)

Crofts
REGD. TRADE MARK

CROFTS (ENGINEERS) LIMITED
POWER TRANSMISSION ENGINEERS
THORNBURY BRADFORD 3 YORKSHIRE ENGLAND
Phone: 65251 (20 lines) Grams: 'Crofters Bradford Telex' Telex 51186

Branches at: Belfast Birmingham Bristol Cardiff Dublin Glasgow Ipswich Leeds Liverpool London Manchester Newcastle Northampton Nottingham Sheffield Stoke-on-Trent. Subsidiary Companies in Canada South Africa U.S.A. World-wide Representation

has proved impracticable. Mixers and centrifugals work well but, with certain viscous raws, one would always like more centrifugals than one has! Our 3rd Crop grain is inconsistent but purges quite well, especially when it is remembered that the average massecuite purity (sucrose on solids) is 67% and the viscosity of the masse reminds one of asphalt. Measured viscosities of molasses have varied between 3,000 and 30,000 poises at 20°C but our molasses is more or less aerated and we are doubtful about the accuracy of these figures. Against the improved exhaustion must be set the cost of the 3rd Crop plant, which was 45% of the recovery plant; the law of diminishing returns operates as obviously in this as in any refining process. But we have never succeeded in finding where the economic end-point in molasses exhaustion lies!

The filtration plant, now supplied with a much improved filter-aid, has worked satisfactorily except

Table I

	Old	*New*
Affination:		
Wash water % crystal	6·5	5·1
Raw syrup solids, % melt	15·1	13·0
Affined sugar ash, % solids	0·14	0·10
Recovery:		
Masse solids boiled, % melt	42·4	43·6
Actual molasses TS—'ideal' TS	+3·5	+1·1
Recovered sugar ash, % solids	0·13	0·135
Carbonatation and Filtration:		
CaO used, % melt.....	0·48	0·48
Tons melt per press-cycle	23·9	32·8
% colour removal	49	40
Evaporator Station:		
Total steam used, % melt	25·0	20·0

that the large plate and frame mud presses have proved cumbersome, awkward of access and manipulation of the cloths difficult. We are now carbonatating our liquor to a final pH of 8·4, instead of 8·9

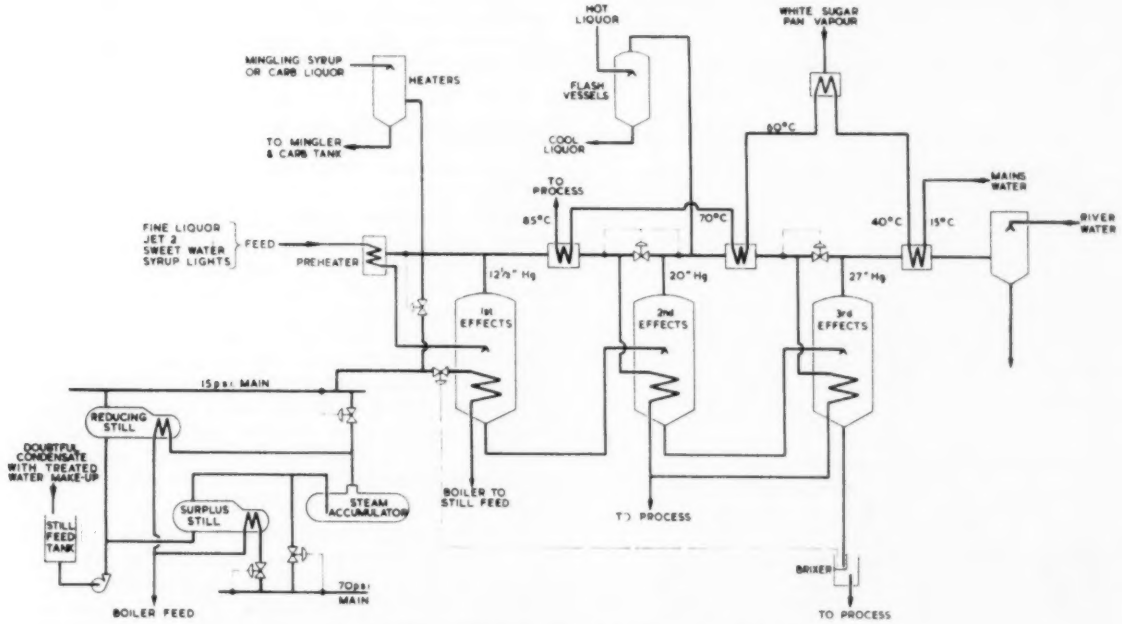
Table II

	Affination		*Recovery*		*Carb. & Filt.*	
	Old	*New*	*Old*	*New*	*Old*	*New*
No. of men per shift	12	4½	15	8	10½	4½
Steam used, % melt	3·9	2·7	15·3	10·0	3·0	1·7
Power used, kWh/ton melt	5·1	7·0	6·7	6·1	5·7	6·1
Maintenance % Replace Value*....	8·9	7·3	3·8	4·1	6·4	7·8

(* i.e Annual maintenance expense % replacement value of plant)

in the old plant; the reduced ash build-up in the Suchar cloths has greatly extended their life but the liquor inverts more easily. Better defecated liquor has saved 3% of the charring costs but we are now trying to restore its higher pH by adding milk-of-lime to the pressed liquor, thus preserving cloth life while minimising inversion on char.

In the evaporator station there have been conventional teething troubles with controls, level detectors and pipe blockages; apart from present flows of materials diverging from design estimates and upsetting the balance of the station slightly, the automatic control system—an essential with so complicated a plant—has worked well, saving a useful quantity of steam and running with little attention.



SIMPLIFIED DIAGRAM OF EVAPORATOR STATION

Fig. III

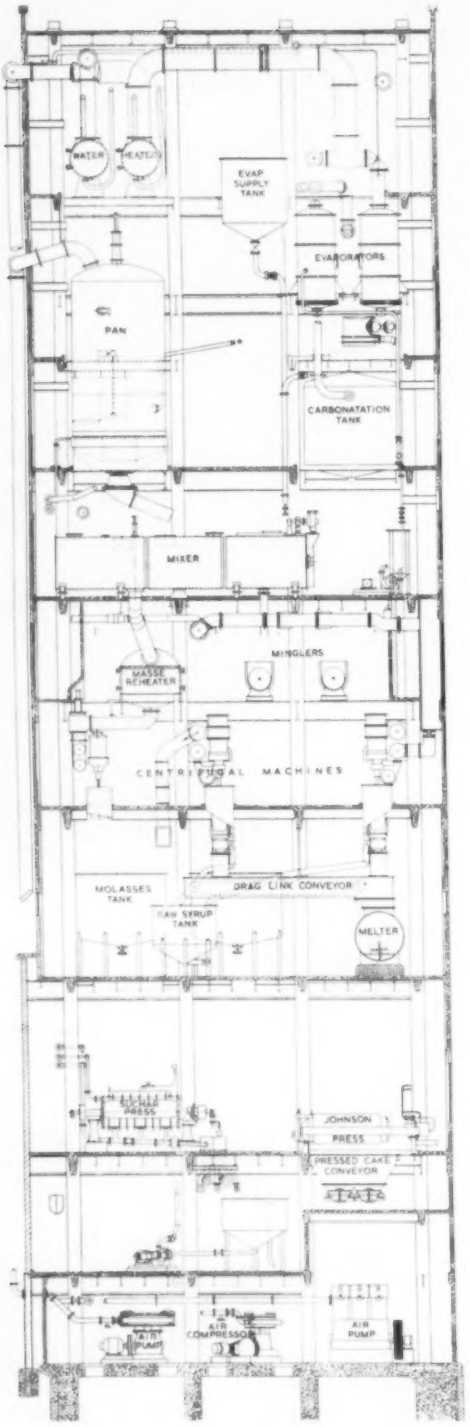


Fig. IV

There are still some general comparisons with the past to be made and lessons for the future learned. Table II compares some basic figures for each process.

These figures tell a story. We save £17 of wages each year for every £100 of capital we have spent on instruments and controls—but at the price of extra cost, complication and maintenance. This price is not low. Fewer men mean less margin to cover illness and cleaning operations. Automatic controls have greatly complicated starting up of all processes and their reliability can still stand improvement. It will be seen that except for affination, maintenance costs have risen by more than the apparent increase in size and complexity of the plant. We hope time will improve this. On the other hand, the steam savings have, as always, exceeded our expectations and, unusually, without a penalty in increased power consumption.

In general we are feeling the converse of our experience 25 years ago with our then new white sugar plant, the benefits of whose simplicities—in extracting market sugar in 3, not 5, boilings—were quite underestimated: in designing the Recovery House we underestimated the penalties of complexity. In future we would aim when in doubt for manual, not automatic, operation, for standard units of plant and for standard control mechanisms. For example, it is now fashionable to work valves by a servo-mechanism; the old chain valve may look unsightly but it is cheaper and requires no attention.

Centralization of many processes in one building has helped supervision and process control but a high building needs good vertical communications. Compactness has in all respects benefitted heat saving and, with process improvements, has reduced Plaistow's total F and A steam consumption to about 95% melt.

Sugar loss has continued to be an intractable problem. Our overall loss of sucrose remains around 0·5% melt solids and we suspect that shorter retention times in pans and cooler storage of syrups are offset by longer times in mixers and by processing syrups of higher non-sugar content.

We can do solids balances across most processes. A statistical analysis of weighing, sampling and analytical errors showed that any loss balance must operate virtually faultlessly for at least six months to produce a significant measurement from a practicable number of samples and analyses. Our first attempt has confirmed these theoretical difficulties and added some practical ones. A continuous balance minimises the ratio of process stocks to input and output quantities but weigher reliability and sampling difficulties have too often wasted many weeks' results. The work continues.

We have thus not found our new Recovery House to be faultless but we are still proud of it. It is a pleasant place to work in. It incorporates many advances in refining technique. Its plant enjoys a magnificent lay-out. But satisfaction and progress are uneasy bed-fellows.

EXPERIENCES WITH JUICE PURIFICATION

By F. SCHNEIDER

Paper presented to the Conference of Austrian Sugar Factory Officials, Vienna, 27th June 1959.

PART II

As a comparison of results from various factories is difficult owing to the difference in beet and mode of operation, we have carried out laboratory tests, naturally discontinuous, on juice purification in the Institute, and compared the results with those of the standard system (progressive preliming, main liming, discontinuous 1st carbonatation). These tests were conducted with raw juices from the same beet, using the same amounts of lime. The thin and thick juice colour values with both juice purification processes are reproduced in Table 6. They were practically identical in both cases. The somewhat high values are explained by the fact that these tests were carried out in January and February on stored beet.

Table 6

Colour (°St. at pH 7)*

Thin juice		*Thick juice*	
Standard	*Braunschweig*	*Standard*	*Braunschweig*
4·9	5·1	5·9	7·5
5·9	5·5	7·5	7·7
5·1	6·9	9·6	9·2
6·8	5·7	9·8	8·8
Ave. 5·7	5·8	8·2	8·3

* $^{\circ}St = \frac{E_{560} \cdot 1000}{Bx \cdot s}$

In the next Table 7 are given further analytical data from a study of the thick juices obtained after both processes. On an average of several tests, we found indentical purities, almost identical alkalinities, identical ash content and the same potassium and sodium content, the main constituents of the inorganic cations. Also with the invert sugar and total nitrogen almost identical values were obtained. One difference that we have experienced in strong measure in our factory tests also occurred in the laboratory; that is, with the BMA juice purification we always found a lower lime salts content than with the classic process. That may be an indication that the colloids which are well-protected in the defeco-saturation, are less prone to attack in the so-called "inter-liming" than in the main liming of the old process.

In Fig. 2 may be seen the Braunschweig juice purification plant in a North German sugar factory. The carbonatation vessels and clarifiers are placed in a semi-circle around the switch board. In this way supervision is easy; a single operator watches the switch board and is only a short distance from the sampling points.

In Fig. 3 is seen the Braunschweig juice purification plant in a South American sugar factory. The carbonatation vessels are placed in a row. On the left is seen the switch board which is adjacent to the switch board (not shown) for the diffusion plant. In this way the supervision of juice extraction and juice purification can be easily combined, which, as has been shown, is absolutely necessary for fully continuous and fully automatic operation.

Table 7

Comparison of the standard juice purification system with the Braunschweig system

	Thick juice							
	Purity	*Alkalinity*	*Ash on 100 Bx*	*K_2O on 100 Bx*	*Na_2O on 100 Bx*	*CaO on 100 Bx*	*Invert on 100 Bx*	*N on 100 Bx*
Standard juice purification system	94·5	0·052	2·50	1·14	0·149	0·043	0·029	0·435
" " "	94·5	0·056	2·46	1·13	0·139	0·032	0·008	0·453
" " "	94·0	0·064	2·73	1·20	0·147	0·026	0·045	0·442
Average	94·3	0·057	2·56	1·16	0·145	0·034	0·027	0·443
Braunschweig juice purification system	94·5	0·068	2·62	1·20	0·147	0·028	0·021	0·439
" " "	94·3	0·054	2·40	1·09	0·143	0·033	0·021	0·453
" " "	94·0	0·075	2·50	1·20	0·149	0·022	0·049	0·434
Average	94·3	0·066	2·51	1·16	0·146	0·028	0·030	0·442

Table 8

Factory operation of the Braunschweig system with beets damaged by storage

Period	*Pol % beet*	*Raw juice Invert/ 100 Bx*	*F_k*	*S (cm/min)*	*Thick juice colour (°St)**	*Beet sliced (tons/day)*
Ave. (19. 10. 58 — 23. 12. 58)	16·30	0·341	1·1	9·2	6·6	3162
(24. 12. 58 — 2. 1. 59)	15·37	1·27	1·3	8·6	13·5	3310
(3. 1. 59 — 12. 1. 59)	15·04	1·33	1·7	9·6	16·9	3250
(13. 1. 59 — 22. 1. 59)	14·77	1·52	2·5	9·5	26·3	3328

* Unsulphitated.

The particular significance of this juice purification process lies in the adaptability to the particular beets. With the classic process the danger has always been recognized of a drop in the capacity of the factories with the processing of beet damaged by frost or in storage. As is seen from Table 8, this is not the case with the BMA juice purification system. The values recorded are again taken from the Austrian

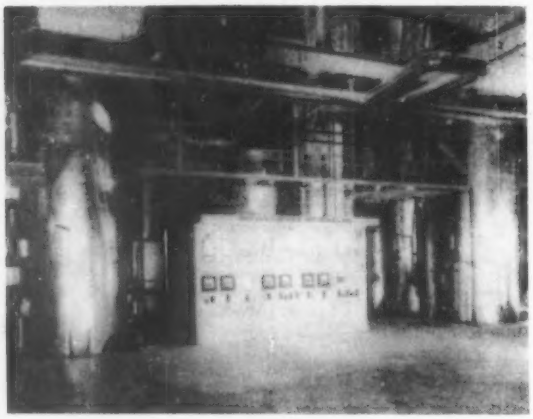


Fig. 2

factories already mentioned, which processed 3162 tons of beet daily from the campaign start to about Christmas. As may be judged from the invert sugar content of 0·43 on 100°Bx, the beet was up to this time completely normal. During the next three 10-day periods the beet pol fell from 16·3 to 14·8 as a result of frost, while the invert sugar content of the raw juice rose to 1·52, i.e. by about five times. The beet had thus been severely damaged. Nevertheless, the filtration coefficient of the muddy juice rose only slightly, its settling rate even remaining unchanged. Naturally the thick juice colour also rose with such

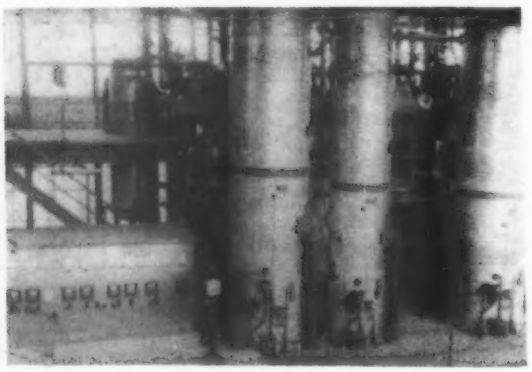


Fig. 3

high invert sugar values, but this is ultimately the case with all other processes. The throughput was in any case maintained, and even rose. In the year previous with similar deteriorated beet and with the same diffusion and sugar-house equipment, but using a classic, partly new, juice purification process (preliming, main liming and continuous 1st carbonatation), the slice fell from 3100 to 2600 tons daily. This decrease came about despite the exhaustion of such possibilities as muddy juice and thick mud return.

The results of this table will demonstrate that the Braunschweig juice purification process in the arrangement of its equipment offers the possibility of dealing with difficulties caused by the beet. Thus the chemist and engineer are presented with a process, which they can adjust to the beet and juice conditions. They can, for example alter the pH setting which plays a leading rôle with frozen beet, they can vary the lime distribution and the temperature, the amount of returned muddy juice or thick mud, eliminate the inter-liming, and thus avoid high alkalinity or they can operate with a defeco-saturation in three stages. Further, they can operate with or without after-liming or 2nd carbonatation or defeco-saturation.

Braunschweig juice purification has given, in only a few years, very good results in Germany, Austria, Yugoslavia and in South America, under the most variable conditions.

BREVITIES

Morocco sugar industry expansion[1].—Within a few years the sugar production of Morocco is planned to reach 300,000 tons per annum. Late in 1960 the first beet sugar factory is to be put into operation at Sidi-Kacem, 125 km from Rabat, while further factories are to be erected later. The factory will slice between 20,000 and 30,000 tons of beet per year and its sugar will be refined in Casablanca and Tetouan.

* * *

Jamaica sugar Crop, 1960[2].—The 1960 crop in Jamaica yielded 418,276 tons of sugar. Of this total 195,324 tons have been shipped to the United Kingdom, 100,899 tons to Canada, and 39,362 tons to the United States. The latest estimate of the 1961 crop is 443,650 tons.

* * *

Sugar production in British Honduras[3].—Operations ceased officially on the 9th September but one last shipment of 300 tons was despatched early in October bringing the total sugar produced to 13,641 tons. This is considerably below estimates, owing to a drought in the maturing period, fires when the cane was being reaped and heavy rains causing delays in delivery.

* * *

Danish beet crop affected by rains[4].—Torrential rain, which has turned many Danish sugar beet fields into seas of mud, will force sugar production costs up to 40% according to reports from Copenhagen. Officials of the industry say that the rain has ruined the crops,

[1] F. O. Licht, *International Sugar Report*, 1960, **92**, (Supp. 20), 254.
[2] *Overseas Review* (Barclays D.C.O.), November 1960, 70.
[3] *Overseas Review* (Barclays D.C.O.), November 1960, 80.
[4] *Public Ledger*, 5th November 1960.

TURBINE DRIVE GEAR BOXES
by Duncan Stewart
DUNCAN STEWART & CO LTD.
PARK GATE, GLASGOW C.3.
SIX-650 b.h.p. Gear boxes under construction for South Africa

Suchar ACTIVATED CARBON

effectively eliminates color, taste and odor from sugar

Specifically developed for the cane sugar industry, SUCHAR activated carbon is the best way to remove colors, odors and flavors from sugar liquors.

Amazing surface area and porosity make it the most efficient carbon you can use. And since *less* SUCHAR can treat *more* sugar, it's economical, too. Actually cuts your carbon costs by 10% or more.

For many years, SUCHAR has helped the cane sugar industry produce better sugar with activated carbon, Auto and FAS-FLO* Filters and expert engineering service. We'll be pleased to help you. As a start, let us quote on your requirements.

*Reg. TM of FAS-FLO Filter Corporation, New York

SUCHAR SALES CORPORATION

CONSULTING ENGINEERS

76 Beaver Street
New York 5, N. Y.

Cable Address: "SUCHARING" N.Y.

EXCLUSIVE DISTRIBUTORS OF SUCHAR ACTIVATED CARBON FOR THE CANE SUGAR INDUSTRY

Sugar cane diffusion—its effect on factory. C. H. McALISTER. *Proc. 18th Ann. Meeting, Hawaiian Sugar Tech.*, 1959, 29–31.—Operation of the diffusion pilot plant at Kekaha is discussed and some performance data are cited together with anticipated changes in factory operation with diffused juice. Costs of a diffuser are expected to be 60% of a milling train, there is less gearing, etc. and maintenance, steam or vapours of 5–15 p.s.i.g. may be used instead of 135–400 p.s.i.g. with mills, and fewer juice heaters are required because of the high temperature of the diffusion juice. The problem of bagasse dewatering must be considered. Recommendations as to the preferability or otherwise of diffusion compared with milling are expressly omitted.

* * *

The Conklin system of sugar boiling. D. G. CONKLIN. *Proc. 18th Ann. Meeting, Hawaiian Sugar Tech.*, 1959, 99–101.—The system is based on the boiling point elevation as a supersaturation index. A syrup charge is boiled to 18½° B.P.E., when ball mill slurry is introduced. A button is then pressed actuating the synchronized cams of the B.P.E. and vacuum time controllers. After a pre-set five min, the cams start to rise. When the vacuum has fallen 1 in Hg after 3 min, the B.P.E. cam makes a contact actuating the pneumatically-operated water feed valve. After 30 min, both controllers stop and a string proof is made. The controllers are again actuated for the 30 min cooling period, the B.P.E. cam maintaining the required massecuite density. Boiling time is 2½ hours from 19 to 26° B.P.E. If syrup runs short, the cam may be stopped and water feeding started.

* * *

Steam generation in a raw sugar factory. E. T. OGASAWARA and S. MASUMOTO. *Proc. 18th Ann. Meeting, Hawaiian Sugar Tech.*, 1959, 106–111.—The boiler feed water sources and associated contamination problems are discussed, together with treatments for removal of O_2, CO_2, H_2S and ammonia, oil, and suspended solids. A sugar detector invented by Alston & Morse, based on the alpha-naphthol reaction with sucrose, has been found to be less suitable than an instrument comprising a water-jacketed chamber containing an H ion exchange resin bed, which absorbs ammonia and converts the other electrolytes into acids. The treated condensate passes to a conductivity cell, which gives an audible signal when the conductance exceeds a pre-set value. Conductivity is measured on the principle that it is a result of the presence of ash introduced with entrained sucrose. The resin is regenerated weekly with a 10% HCl solution and the unit has been found to be reliable in continuous detection. Details are given of internal treatment of the boiler feed water with sodium sulphite and caustic soda to absorb oxygen and maintain a high pH. The Larson-Lane steam analyzer is described. The steam is condensed in a vented chamber, most of the CO_2 and some ammonia being removed. The condensate then passes through a conductivity cell and through a H ion exchange bed, after which it is reheated to b.p. and passed through a second conductivity cell. Metallic cations and NH_4 are replaced by H ions. Tests with known amounts of phosphate, chloride and sulphite added to the condensate showed that an increase of 4–5 micromhos indicated a carryover increase of 1 p.p.m. Normal conductivities were 15–25 micromhos (untreated) and 4–6 micromhos (resin-treated); 0·4–0·6 p.p.m. each of chloride and phosphate were present.

* * *

Vacuum and condensation equipment in sugar factories. B. N. PANDEY. *Indian Sugar*, 1960, **10**, 401–402, 410–411.—The equipment considered includes condensers and vacuum pumps. Examples are worked to illustrate how the amount of cooling water required for jet condensers may be calculated using a simple formula given, and vacuum pump capacity calculated on the basis of cane throughput per hour and injection water temperature.

* * *

Profitable mill operation through co-ordination. E. W. KOPKE. *Sugar y Azúcar*, 1960, **55**, (9), 45–46.—High monetary losses in raw sugar factories using obsolete and uneconomical equipment and practices are discussed. A concrete example dating from 1916/17 is quoted where impurities came out of solution during boiling and resulted in a highly contaminated sugar. This was remedied by introducing A-molasses clarification by centrifuge, which improved boiling and crystallization.

* * *

Automatic juice scale constructed at the mill. J. E. STRANG. *Sugar y Azúcar*, 1960, **55**, (9), 47, 61.—The automatic juice scale operated at Ogle factory, British Guiana, for 19 years until 1959 is described with a diagram. It operated on a weighbeam system, one of two tanks filling with juice until equilibrium was reached with a counterbalance drum filled with 85·8°Bx final molasses. When the system became unbalanced, the juice inlet closed, the tank fell and its discharge port opened, while the other tank rose and juice flowed into this. Accuracy was ± 0·15%.

Preparing refined sugar for silo storage. H. KRAUTMANN. *Sugar y Azúcar*, 1960, **55,** (9), 50–51, 61.—Spun white sugar should be cooled and dried as follows: dried to 0·025–0·03% moisture content in one process and cooled to a temperature as near as possible to ambient. Agitation, carried out in the initial drying stage to prevent caking, should cease at 0·2–0·3% moisture content. The dryer and cooler should be able to handle water-washed sugar of 2% moisture content at 113°F and steam-purged sugar of 0·5% moisture content at 185°F, and be able to reheat stored sugar to ambient temperature. Natural ventilation with outside air may be used to cool sugar to 18–27°F above ambient. The need to maintain the sugar quality during storage is emphasized. The Büttner Turbo Tray dryer and cooler is described and white sugar silos of the Weibull type are discussed.

* * *

A systematic study of sugar quality improvement. H. S. WU. *Taiwan Sugar*, 1960, **7,** (6), 13–16.—Experiments carried out to ascertain the cause of the high ash content of Taiwan sugar are discussed. In the centrifugals, water washing was slightly less effective than double curing as far as sugar quality was concerned. It was also found that the largest portions of ash were in the outer film on the sugar crystal and in the centre. Boiling seed on syrup at one factory instead of *A*-run-off resulted in a 30% drop in the ash content. Adding sodium carbonate and NaOH to 1st carbonatation juice decreased the CaO content and thus reduced the ash content of the sugar. Storage tests showed that pure sucrose pol reduced to about the same pol as TSC sugar of 99·82 pol after 14 months. At one factory 16 bags of sugar per 1000 were damaged by moisture compared with only 7 per 1000 from another factory producing sugar of higher ash content.

* * *

Dehydration of bagasse. Utilization of waste heat in flue gas. J. C. CHOU. *Taiwan Sugar*, 1960, **7,** (6), 17–23.—Stoichiometric relationships are presented for bagasse burning and the resultant flue gas to study the possibility of drying green bagasse with the flue gas. An experimental dryer 38 ft high and utilizing 6000 cu.ft./min of the flue gas from a boiler was used in tests in which the bagasse fed into the top fell to the bottom against a counter current of flue gas. At a feed of 0·8 to 3·6 tons/hr of green bagasse, the moisture content would be reduced from 43% to 26–39·6%. The optimum rate is 1·6 tons/hr, when the moisture content is reduced to 32·6% and the net fuel value of the bagasse is increased by 15% on the original green bagasse. The scheme is economical at a minimum bagasse price of NT $115.0 per ton.

* * *

The "AKA" Olier filter with pre-coat. L. OLIER. *Zucker*, 1960, **13,** 521–523.—Details are given of the construction of the Olier "AKA" candle-filter. The metal candles each have an o.d. of 30 mm and are 1 m long, with a filter surface of 0·1 sq.m. Kieselguhr is used as pre-coat. No details are given of throughput, cycle time, etc.

Treatment of boiler water. C. N. RAO. *Indian Sugar*, 1960, **10,** 271–273, 289.—The raw boiler feed water (6500 gal/hr) at the author's factory is internally treated at 8-hourly intervals by addition of NaOH (3 lb/day), sodium carbonate (10 lb/day), and trisodium phosphate (1 lb/day) to maintain a total hardness below 2·0 p.p.m. Details are given of water analyses in 1959/60. A very thin film of scale is formed on the boiler tubes, and this is easily removed by mechanical cleaning.

* * *

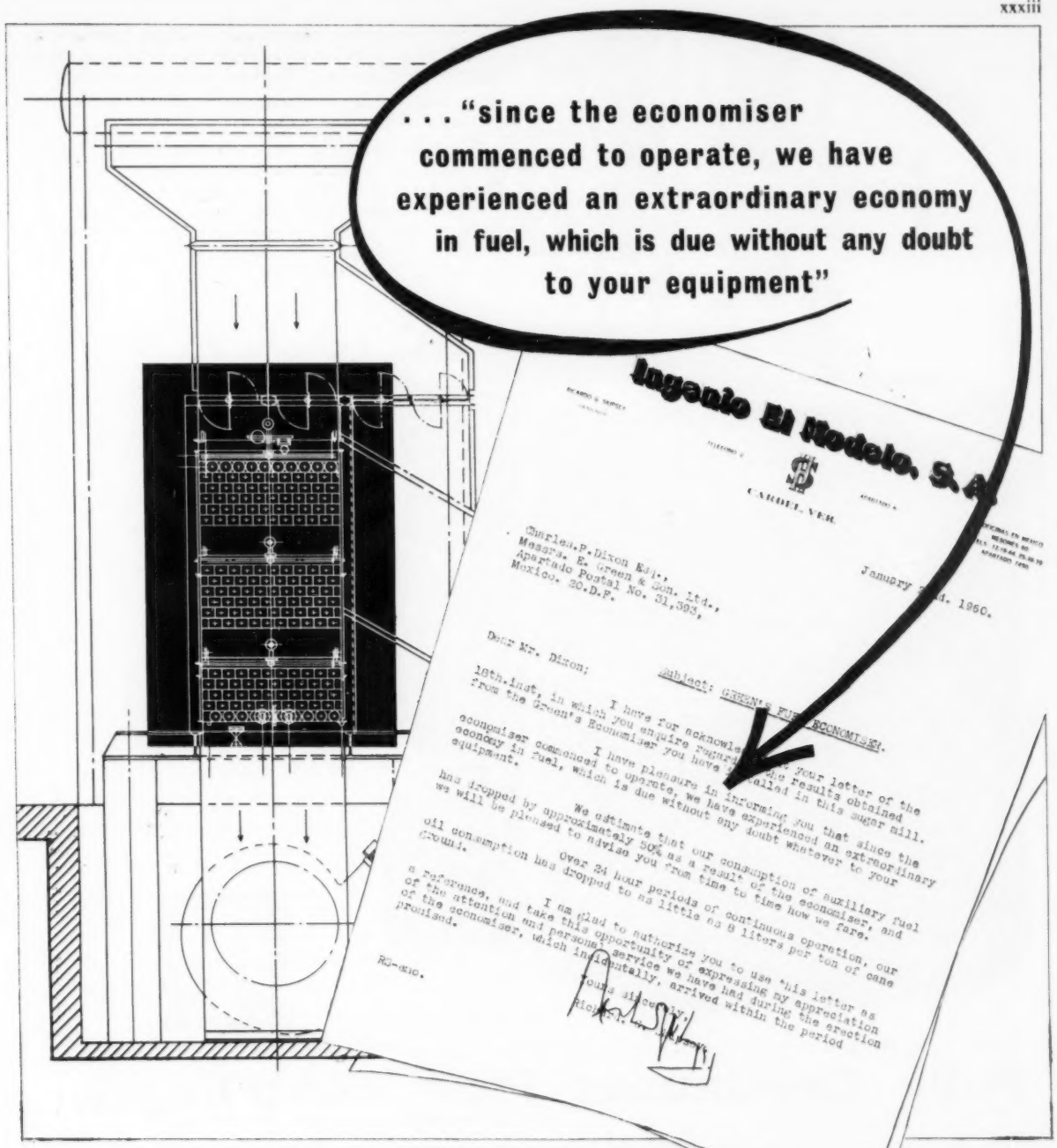
Erection of two sugar mills in India. S. KLIŠČ and L. HLÁVKO. *Czech. Heavy Ind.*, 1960, (10), 7–14.—Details are given of Panipat (Punjab) and Kuralguri (Assam) sugar mills, built by Škoda. The Panipat mill was designed for a crushing capacity of 1000–1250 tons/day, producing plantation white sugar using a double carbonatation–double sulphitation process. It uses a 4-boiling scheme and data for 1957/58 reveal a reduced mill extraction of 93·35 at 15·33 fibre % cane and a molasses yield of 3·5% on cane. Sugar is of 99·90 pol and yield 9·05% on cane. Details are given of the 15-roller mill, cane conveyor, boiling equipment and of the lime plant. The Kuralguri mill is a double-sulphitation factory with a 1000 tons/day capacity. This uses a 3-boiling scheme. No performance data are given.

* * *

Experiences from the 1960 Cuban (raw sugar refining) campaign in Löbau sugar factory. S. ZIEMANN. *Zuckererzeugung*, 1960, **4,** 299–300.—Raw cane sugar is melted to 60–62°Bx at a minimum temperature of 70°C while milk-of-lime is added to give pH 7·5–8·0. After defeco-saturation at 52–58°C with 2·0–2·5% CaO (as 15°Bé milk-of-lime) to pH 8·3, the melt is heated to 75–78°C and filtered and active carbon and kieselguhr (0·10% and 0·14% respectively on sugar) added. The melt is reheated to 75–78°C, filtered again, the cake being added to the melt before 1st filtration. It is polish-filtered on bag filters to give a purity of 98·5–99·0. A 5-boiling scheme is used, *A*-product run-off of 96·5 purity being used a feed for the *B*-massecuite, which is boiled on *D*-sugar as seed. The *B*-product run-off of 92·5 purity is boiled to *C*-massecuite of 91·7 purity on *E*-sugar as seed, while the *C*-run-off of 83·8 purity is boiled to *D*-massecuite of 85·7 purity and the *D*-run-off of 69·4 purity is boiled to *E*-massecuite. The *E*-run-off purity is 58·6. The *B* and *C*-sugars are returned to syrup purification while the *A*-sugar, cured without cooling the massecuite in crystalizers, has an ash content of 0·010–0·03%.

* * *

Sugar drying with a plate dryer. G. HOYER. *Zuckererzeugung*, 1960, **4,** 310–313.—The advantages and disadvantages of various types of sugar dryers are discussed, and data for a granulator, "Roto-Louvre" dryer, spraying shaft dryer and two plate dryers are compared. The plate dryer is described in detail and the combination of granulators and plate dryers advocated for a sugar of high moisture content which is reduced to 0·2% in the granulator and the sugar further dried and cooled in the plate dryer.


. . . "since the economiser commenced to operate, we have experienced an extraordinary economy in fuel, which is due without any doubt to your equipment"
Ingenio El Modelo, S.A.
Messrs. E. Green & Son. Ltd.,
Apartado Postal No. 31,393,
Mexico. D.F.
Dear Mr. Dixon;
Subject: GREEN'S FUEL ECONOMISER.
I have for acknowledge your letter of the
18th.inst. in which you enquire regarding the results obtained
from the Green's Economiser you have installed in this sugar mill.
I have pleasure in informing you that since the
economiser commenced to operate, we have experienced an extraordinary
economy in fuel, which is due without any doubt whatever to your
equipment.
We estimate that our consumption of auxiliary fuel
has dropped by approximately 50% as a result of the economiser, and
we will be pleased to advise you from time to time how we fare.
Over 24 hour periods of continuous operation, our
oil consumption has dropped to as little as 8 litres per ton of cane
crush.
I am glad to authorize you to use this letter as
a reference, and take this opportunity of expressing my appreciation
of the attention and personal service we have had during the erection
of the economiser, which incidentally, arrived within the period
promised.
RG-mic.

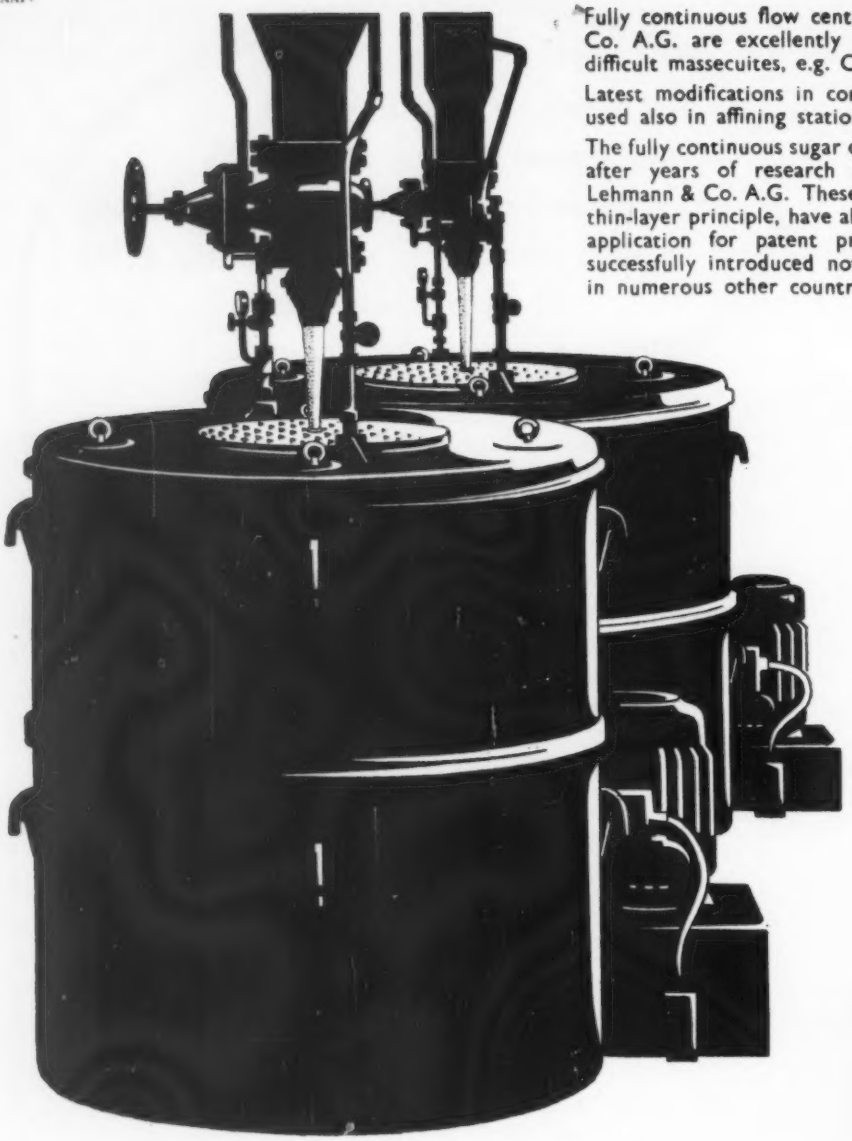
The Green's Economiser installation which has achieved such remarkable savings comprises a Premier Diamond Type 25 Economiser with 170 cast-iron gilled tubes 12 feet long. The installation of Green's Economisers is enabling the sugar industry, in many parts of the world, to effect material savings in the use of auxiliary fuel, or alternatively to cope with additional steam demand without increase in fuel consumption or additional plant.

E. GREEN & SON LTD. WAKEFIELD

Makers of economisers for more than 100 years

★GREEN'S ECONOMISER

GE 214



Fully continuous flow centrifugals of Hein, Lehmann & Co. A.G. are excellently suitable for curing of most difficult massecuites, e.g. C-, final or second product.

Latest modifications in construction allow them to be used also in affining stations.

The fully continuous sugar centrifugal has been perfected after years of research and development by Hein, Lehmann & Co. A.G. These centrifugals, working on the thin-layer principle, have already been copied in spite of application for patent protection. They have been successfully introduced not only in Germany but also in numerous other countries.

Fully Continuous Flow Centrifugals

offer the following advantages:

- continuous working
- reduction of working personnel
- small current consumption, no current peaks
- high output
- light weight
- no special foundations
- vibration-free running
- uniform sugar quality

HEIN, LEHMANN & CO.

Aktiengesellschaft Duesseldorf

Abt. Massentrennung

Telephone: 70201 *Telex:* 0858 2740 P.O. Box 4109

REPEAT NOTICE

A Correction —in our defence

OUR

HL FLOW-CENTRIFUGAL

has been systematically developed to extreme perfection. Its application for B- and C-product and, in a further development, as an affination machine has been fully tested in a number of European and other countries.

In the meantime, comparisons have been made in German and foreign publications between a similarly constructed centrifugal and a centrifugal which shows the characteristics of the HL flow-centrifugal in its various stages of development. Gross errors made by the engineer concerned have crept in, but we are exposing only two of the points which appear vital to us:

(1) It has been stated that all centrifugal stations processing B-product continuously have been equipped with the centrifugal supplied by the engineer. The truth is that our HL flow-centrifugal has processed B-product successfully in continuous operation in Germany and other countries.

(2) It is not correct to state that crystals are damaged in our unperforated and therefore completely smooth acceleration chamber in contrast to the perforated and consequently rough surface of the other centrifugal.

The unperforated and therefore smooth acceleration chamber enjoys provisional protection on the basis of our patent application H 25 146 of the 6th October 1955, published by the German Patent Office on the 21st May 1959. Therefore, for the time being, it can be produced only by us or under licence.

At present only two firms have been authorised to build our HL flow-centrifugals under licence, including the latest improvements.

THEY ARE: For the U.S.A., Canada and Cuba:

THE SILVER ENGINEERING WORKS INC., Denver, Colo., U.S.A.

For France and a number of other countries, the well-known firm

FIVES LILLE-CAIL of Paris.

Only these two firms and ourselves build and deliver the original HL flow-centrifugal.

Please ask for our latest prospectus. We are in a position to advise you expertly and objectively.

Detailed information and advice without obligation from

HEIN, LEHMANN & CO., AG.

DUESSELDORF . SEPARATION DEPT. . P. O. BOX 4109

RUTHS STEAM ACCUMULATOR
FOR FLACQ UNITED ESTATES SUGAR FACTORY, MAURITIUS
MADE BY COCHRAN & Co. ANNAN Ltd. SCOTLAND
CAMIONAGE MAXIME CAYEUX

One of the two Ruths Accumulators supplied to Mauritius

This steam user proved that

STEAM STORAGE

increased factory efficiency and production

As part of an expansion scheme Flacq United Estates Sugar Factory of Mauritius installed two Ruths Accumulators with the result that the existing boiler plant became capable of supplying steam at a steady pressure to the greatly increased process consumers. In addition the increased production is going on with improved efficiency.

The customer states ". . . it is beyond any doubt that the two accumulators . . . have to a very considerable extent helped in attaining this remarkable achievement".

Cochran, the makers of Ruths Steam accumulators, are glad to supply schemes to solve factory steam problems, and invite you to avail yourself of their experienced technical service.

RUTHS
Regd. Trade Mark

STEAM ACCUMULATORS

COCHRAN & COMPANY, ANNAN, LIMITED, 34 Victoria Street, London, S.W.1. *Abbey 4441* and at ANNAN, DUMFRIESSHIRE, SCOTLAND. *Annan 111*

TAS/CH 680

The sugar industry in Afghanistan. Z. SRZEDNICKI. *Zeitsch. Zuckerind.*, 1960, **85**, 540–543.—While the machinery for the first cane sugar factory in Afghanistan was delivered in 1926 by Sangerhausen, it remained packed for about 30 years because of internal unrest and it was only in 1956 that the factory was erected near Jalalabad, capital of the East Province. This factory, however, crushes only 70 tons of cane per day and only 600 hectares of a total of 7,800,000 hectares of arable land are planted to cane. Sugar beet was first grown in 1940, when the Baghlan sugar factory went into production. This factory has a daily slicing capacity of 700 tons of beet and operates on very simple lines as there are no skilled technicians. A 12-cell Robert battery diffuser of 650 hectolitres per cell is used, with mud presses and a Maresch filter for thin juice. For thick juice a 0·5 atm Prokesch filter is used. No main liming is used. Molasses is used chiefly as adhesive for coal dust used in the factory (30–40%) and as fodder (10%), the remainder being discharged into the river. Alcohol production is forbidden on religious grounds. The campaign usually lasts 60 days at below full capacity, because of the shortage of beet. The maximum campaign slice is 35,000–40,000 tons of beet. About 4000 hectares are planted to beet. Artificial irrigation is necessary; the beet do not suffer greatly from pests or diseases, although the yield per hectare over the last five years has been only 11,370 kg of beet. Sugar content in the same period was 16·05% on average.

* * *

Bulk and liquid sugar production at the Brookfield (Chicago) terminal. L. T. JENSEN and W. NEWTON. *J. Amer. Soc. Sugar Beet Tech.*, 1960, **11**, 143–150.—See *I.S.J.*, 1960, **62**, 351.

* * *

Processing cane raw sugar. I. A. ROSTRIPENKO and I. S. GULYI. *Sakhar. Prom.*, 1960, (10), 20–25.—At No. 2 Petrovsk sugar factory, raw cane sugar is mingled with 2nd affination run-off at 85°C and 89·5–90·0% dry solids content, and sodium carbonate solution is added; the resultant magma is melted with filter-press washings to 55% dry solids and 87°C. The melt is limed during 3 min with 2·8–3·0% CaO by weight of raw sugar, saturated to an alkalinity equivalent to 1·5 cc 0·1N H_2SO_3 (*sic*), heated to 90° and sent to the filter-presses. After sulphitation, the melt is pan-boiled, using a standard 4-boiling scheme, the 2nd product melt being sent direct to the 1st product pans. White sugar colour is 0·8–1·1°St. with a yield of 90·2–90·8% on weight of raw sugar. If evaporation is used, the yield falls to 85–86% by weight of raw sugar. Results of crystallization tests with 1st product massecuite are tabulated, showing a purity increase from about 97 to 97·9 during nearly 12 hours' boiling in one case, and a purity drop from 97·2 to 94·1 during 13 hours' boiling. The corresponding dry solids increases were 80·8 to 94·0 and 74·2 to 92·5. A 1st product massecuite containing 40% crystal cooled during 4–5 hr to 45–50°C had uniform crystal and spun normally; the dilution water consumption was 30% on weight of massecuite, and the purity decrease 1–2·5 units. With a crystal content greater than 50%, a massecuite would not cool properly because of its high density. Graphs are presented of 2nd product boiling and crystallization, with crystal content, dry solids, purity and temperature *vs.* time. The average boiling time was 3hr 40 min and crystallization time 8 hr 40 min. Temperature drop was 5°/ hr from 75–80° to 35°C. The proportion of crystals rose from 0 to 45% on the pan and to 57% in the crystallizer. Purity drop was from 95·8 to 92·2 in the pan and 92·2 to 90 in the crystallizer. In one test, a 1st product massecuite was remelted by passing steam into the crystallizer cooling elements; on cooling, the syrup started to throw out crystal suddenly after 1 hr; these crystals were large, relatively uniform and spun well.

* * *

The use of FV filters for sugar dust extraction. S. T. KOZHEMYAKIN. *Sakhar. Prom.*, 1960, (10), 25.—The vacuum filters are divided into up to six compartments, in each of which are 18 135-mm dia. sleeves of cotton or paper. The upper ends are covered with discs attached to a vibratory frame; a screw in the conical bottom of the filter is intended to remove the trapped impurities. The filters have proved inefficient; water vapour entering with sugar dust moistens the filter sleeves and causes clogging, so that eventually air cannot pass through them.

* * *

Automatic device for massecuite boiling. S. I. SOKOLOV. *Sakhar. Prom.*, 1960, (10), 31–35.—Further details are given of the apparatus previously described[1]. Graphs are presented showing the slope of the supersaturation curves according to the supersaturation coefficient at various purities and at different b.p. values of a sugar solution.

* * *

Automatic scales for molasses weighing. F. M. KRIVOROTOV. *Sakhar. Prom.*, 1960, (10), 35–37.—Full details with a diagram are given of a double-tank molasses weigher which incorporates a mercury switch for opening and closing the inlet and outlet valves and changing the feed from one tank to the other. Each tank is of 1000 kg capacity and accuracy is to within ±0·1%.

* * *

Device for determination of calcium carbonate content of bone char. T. MOLCHADSKII. *Sakhar. Prom.*, 1960, (10), 38–39.—A simple volumetric apparatus is described for measuring the gas generated when HCl reacts with the $CaCO_3$ in a 2-g sample of bone char.

[1] GUSEV: *I.S.J.*, 1960, **62**, 289.

BEET FACTORY NOTES

Problems of filtration. H. HARTL. *Zeitch. Zuckerind*, 1960, **85**, 464–470.—The basic principles of filtration, particularly mud filtration, and the formation of filter-cake are discussed. Filter cloth fabric and kieselguhr are studied with the aid of photomicrographs. A "Herfilco" pressure settling filter installed at Tulln factory is described. This consists of a horizontal drum with a juice feed pipe in the bottom and the discharge pipe at right angles to the feed. Twenty-eight frames making a total filter surface of 50 sq. m. are attached to the clear juice pipe (a continuation of the discharge pipe) and revolve during sluicing, which on an average lasts 10–12 min. Cellulose pulp is mixed with kieselguhr to form a 3–5 mm pre-coat and sluicing stops when the filtrate returning to the sluice tank is not turbid. The filter is used for 1st and 2nd clarified carbonatation juice. Pressure is 0·4–1·5 atm with normal juices and 3 atm with poor juice. Throughput is at 900–1000 litres/min. After 15 hr filtration 1200 kg of muds are retained with a filter-cake thickness of 1·5–2 cm; the cake is so porous and spread out that it easily slips off when the filtration stops.

* * *

Manometers with elastic measuring units. W. BACHMANN. *Zeitsch. Zuckerind.*, 1960, **85**, 476–480.—Different types of pressure gauges with expanding elements are described and hints are offered on suitable mounting. The measurement of the pressure of corrosive materials is discussed and the diaphragm separator described.

* * *

Some remarks on the carbonate process. E. MOEBES. *Zeitsch. Zuckerind.*, 1960, **85**, 480–483.—The points raised by VAJNA[1] on the carbonate process are discussed. The suggestion that regeneration of strongly basic anion exchange resin is inadequate is refuted; it is also denied that 2nd carbonatation juice contains 25% of its total anions as carbonate ions. Other points cover the Ca carbonate precipitation, colour absorption, the formation of alkali carbonate when the anion exchange resin is regenerated with ammonium carbonate. Calculations are presented to show that the process is not uneconomical.

* * *

Report on the first beet sugar campaign in Pakistan. H. KAMPF. *Zeitsch. Zuckerind.*, 1960, **85**, 486–489.—Charsadda Sugar Mills Ltd. started the first beet campaign in Pakistan on 15th May 1960 and until 2nd July processed an average of 735 tons of beet per day, with a maximum of 1131 tons. Average beet pol was 14·67% with a maximum of 17·0%. White sugar yield was 9·02% on beet (maximum of 10·71%). As the May and June day temperatures are 42–45°C and night temperatures 22–28°C rapid processing and as short a beet storage as possible are necessary. A DdS diffuser is used with an hourly capacity of 60 tons of beet. Brieghel-Müller pre-liming is also used.

* * *

Simplified calculation of the quantity of pressed pulp. R. LOSERTH. *Zucker*, 1960, **13**, 484–489.—The formula of Schneider[2] for evaluation of the quantity of pressed pulp requires very accurate determination (by analysis) of the various factors, while the formula of Mück[3] has been found to give accurate values, although it has the disadvantage shared by the Claassen formula that it is based on the use of fresh water. The Mück formula should, therefore, be used although with some reservation, re-calculating the average values often required. The present author has derived a formula for calculation of the quantity of pressed pulp based on the pulp marc content. Tables of the marc content, which is easily determined, throughout the campaigns since 1951/52 show very little fluctuation. The formula which is claimed to be more accurate than the Mück nomogram is given as

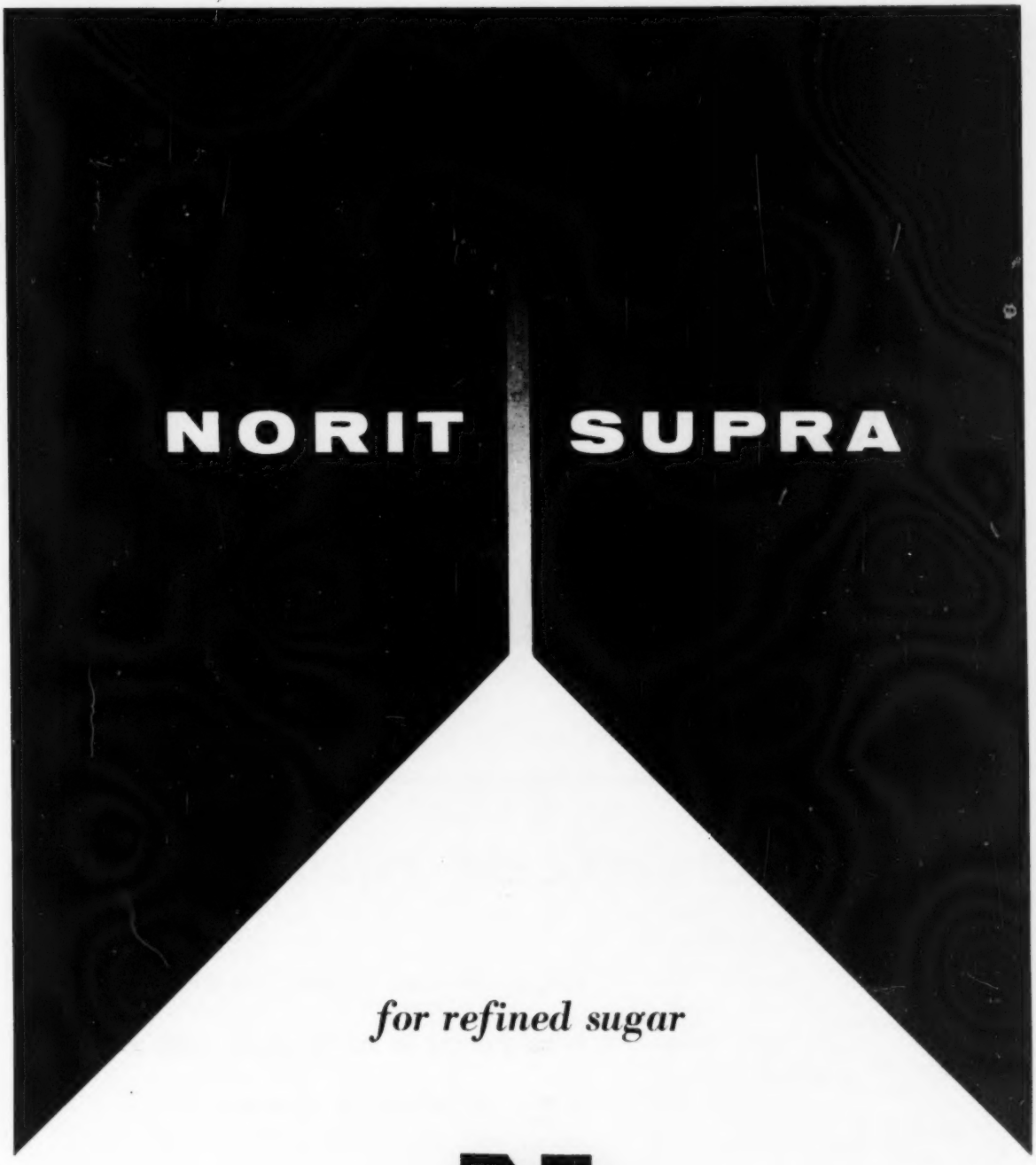
$$\% \text{ pressed pulp on beet} = (100 + P_p + \text{sol. } NS_p) \times \frac{M}{T_p - (P_p + \text{sol. } NS_p)}$$

where M=fresh cossette marc content, T_p=pressed pulp dry solids content, P_p=pressed pulp pol, and sol.NS_p=soluble non-sugars in pressed pulp.

* * *

Purification of sugar factory waste waters by the soil. D. KRAMER. *Zucker*, 1960, **13**, 436–441, 489–493.—The use of sugar factory waste waters as fertilizer and the simultaneous purification of it by the soil and plants is discussed with 44 references to the literature. The extent of purification increases with the concentration of waste water but decreases as soil depth increases. A temporary increase in the soil moisture content when irrigating with waste water will also increase the degree of purification. The decomposition in the soil of organic substances in the waste water may be represented as a logarithmic function $A_T = A_o/10^{T/c}$, where A_T=residual BOD_5 (mg/litre) of waste water in soil depth T (cm), A_o=BOD_5 of waste water used for irrigation in mg/litre, and c is a constant. The soil may be considerably enriched with N and P, and particularly Na: at 50–450 mm irrigation depth the N lost from the waste water may be 50–70% and up to 55% for the phosphoric acid content, with up to 95% Na. The adsorption of these takes place almost exclusively in 0–30 cm depth of soil. Calcium is washed out of the soil, however, especially with increasing amount of irrigation water. The pH of the water increases with average irrigation by about one unit during its passage through the soil, and should be at least 6 to prevent harming the soil.

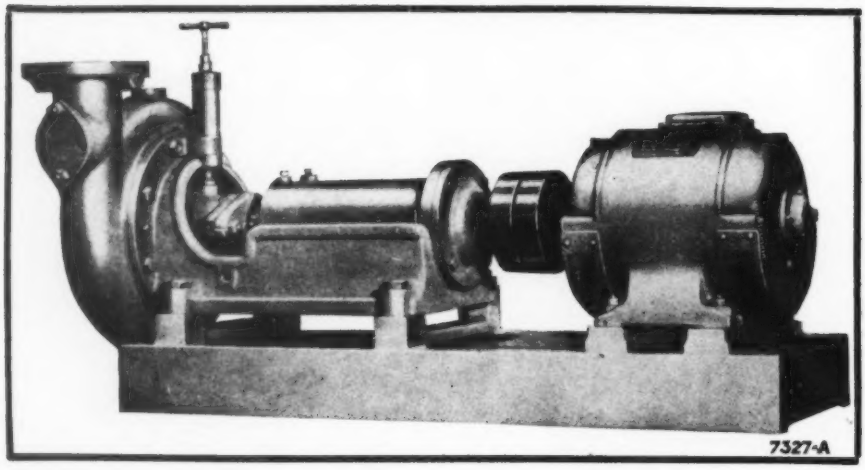
[1] *I.S.J.*, 1960, **62**, 354.
[2] *Zucker-Beihefte*, 1950, **1**, 1.
[3] *Deut. Zuckerind.*, 1940, **65**, 459.



UNITED NORIT SALES CORPORATION LTD - AMSTERDAM - HOLLAND

Streamline

MILL IMBIBITION PROCESS



MIRRLEES CHOKELESS PUMPS

Recent installations:

VENEZUELA—
El Palmar and Rio Turbio;

PUERTO RICO—
Central Guanica;

CUBA—
Palma; Ermita, Providencia;

BRITISH WEST INDIES—
Basse Terre, Antigua, Corozal, Richmond, Rosehall, Hampden;

DOMINICAN REPUBLIC—
Boya, La Romana.

Install Mirrlees Unstrained Return Juice Pumps in conjunction with scraper, rotary or vibrating screens.

★

Full information on request:

THE MIRRLEES WATSON COMPANY LIMITED

Head Office and Works: SCOTLAND STREET, GLASGOW, C5.
London Office: 38 Grosvenor Gardens, S.W.1.

The technological characteristics of the Buckau-Wolf diffuser. K. HEINRICH. *Zucker*, 1960, **13**, 493–495.—The design of the Buckau-Wolf continuous diffuser[1] is described. Actual performance figures have shown that even at only 40% of the design throughput, sugar losses have been well below 0·1% on beet at 100% juice draught. A 3300 tons/day diffuser is currently in course of construction.

* * *

Salt-containing diffusion supply water in sugar factories. H. MÜHLPFORTE. *Zuckererzeugung*, 1960, **4**, 276–278. Tables and graphs are presented to demonstrate the effect of the chloride content of diffusion water taken from rivers on sugar and molasses yields and on the chloride content of raw and thick juice. Figures are also tabulated of the content of K_2O, Na_2O and SO_4'' (mg/litre) in the process water of four factories. A factory which has no alternative source should, in the event of a high salt content of river water, recycle the diffusion waste water.

* * *

Deionization of sugar solutions by electrodialysis with ion exchange membranes. IV. Pilot plant tests. J. BURIÁNEK, D. ŠLECHTOVÁ and O. LISÝ. *Listy Cukr.*, 1960, **76**, 193–201.—The two most important factors in economical dialysis are effective membrane surface and power consumption. These are influenced by: the composition of untreated juice, degree of ionization, concentration of the separated electrolyte solution, % utilization of membrane area, distance between membranes, and the deionization temperature. The relationship between the resistance between electrodes and the resistivity of a NaCl solution was established and thus the total resistance throughout the dialyser length calculated, adding the resistance in the juice and electrolyte spaces and of the membranes, using a dialyser containing 50 each of "Permaplex C 20" and "Permaplex A 20" membranes. A mixed syrup of about 75 purity was used in the tests, details of which are tabulated.

* * *

Decolorizing ion exchangers. X. Calcium retention. E. ANIŠČENKOVÁ, K. ČIŽ and V. VALTER. *Listy Cukr.*, 1960, **76**, 202–207.—Amphoteric ion exchangers ("Wofatit E" and "5 A"), weakly basic *m*-phenylenediamine ("1 A" and "1 M") and polyamide ("PA") exchangers were used in static and dynamic tests to determine the degree of Ca adsorption from thin and thick juice and refinery syrup. Graphs and tables are presented showing how the extent of lime adsorption falls with the lime concentration of the solution. The adsorption capacity increased considerably as the amphoteric resins aged, owing to the loss of internal neutrality (change in the anion exchange groups). The adsorption capacity of the amphoteric resins was greater with 1·5% NH_4Cl regeneration at pH 6–8, at an average adsorption of 4·1 g CaO/litre, than with HCl regeneration. The average efficiency of refinery syrup deliming with the amphoteric exchangers was 29%, with the weakly basic 20% and with the polyamide 23%; for the thick juice the corresponding values were 10% ("Wofatit E"), 6% and 10% ("1A" and "1 M" repectively). The lime content of the solution up to 400 mg % CaO/100 dry solids did not affect decolorizing at constant pH.

* * *

Experiments with a BMA diffuser at Opava sugar factory. K. ČIŽ, R. OSVALD and P. PAVLAS. *Listy Cukr.*, 1960, **76**, 207–211.—Some performance data for a BMA and a Robert diffuser are compared and details given of the pH, Brix and ash content of the juice at various points in the BMA column. The losses are approximately identical at identical juice draughts. Considerable foaming in the raw juice tank gave some difficulty with the BMA and a drop in pH occurred where cossettes accumulated at the juice screen.

* * *

Protection of diffusers against corrosion. O. BÖHM and O. LISÝ. *Listy Cukr.*, 1960, **76**, 211–216.—Tests on sections of various diffusers revealed that the greatest weight loss due to corrosion occurred in the BMA and Robert diffusers and the lowest loss in the Olier. While coats of special anti-corrosion paints[2] are recommended for the first two, in the case of the Olier it would be uneconomical.

* * *

Analysis of the work of hydrocyclones. S. BEDNARSKI and F. GROTTHUZ. *Gaz. Cukr.*, 1960, **62**, 236–242.—The use of hydrocyclones for treatment of milk-of-lime, 2nd carbonatation juice and flume water is discussed with illustrations. Milk-of-lime of 21°Bé has been purified to the extent of 96–100% at 1·5–1·8 atm feed pressure. At 2·2 atm pressure 96·5% purification efficiency has been achieved with 2nd carbonatation juice and 93–98% efficiency at 2–4 atm pressure with flume water, or 85–88% at 0·8 atm feed pressure.

* * *

Automatic continuous control. S. ZAGRODZKI and J. DOBRZYCKI. *Gaz. Cukr.*, 1960, **62**, 242–245.—Automatic control at various stations in the sugar factory is discussed with 28 references to the literature. Under present circumstances, the only fully automatic processes should be material flow at the beet end and in evaporation. The juice purification station must be of sufficient capacity to handle the incoming raw juice, as the slightest fluctuation will upset the balance of diffusion. The impulses from the juice level control in the holding tanks should act as signals for regulation of the tempo at other stations. Quantity measurement should be used in the case of fresh cossettes, raw and thin juice, thick juice and white sugar.

[1] *I.S.J.*, 1957, **59**, 325.
[2] *See also* BÖHM and LISÝ: *I.S.J.*, 1960, **62**, 21.

Demineralization of sucrose solutions by electrodialysis. M. LESZKO. *Gaz. Cukr.*, 1960, **62**, 246–248.—Means of manufacturing and evaluating ion exchange membranes are discussed and details given of the demineralization of a sucrose solution with a 17-cell dialyser. The degree of demineralization was 97·2%. NaCl (3 g/litre) was used as the cathode solution and $NaHCO_3$ (42 g/litre) as the anode solution. Optimum values are: resistance of 270 ohms/sq.cm., with 7·5 mm wide membranes; assuming 1 sq. m. of membrane per 0·0624 cu.m. of juice, each battery of 100 cells to treat 150 cu.m. of juice per day, and a power consumption of 3·58 kWh/cu.m.

* * *

Dry pulp briquetting at Kaposvár sugar factory. L. ECSY and I. ERDÉSZ. *Cukoripar*, 1960, **13**, 245–248. A briquetting unit, the "Orbit 70", supplied by Richard Sizer Ltd., is described in detail with illustrations. Molasses may be mixed in with the pulp before briquetting, the minimum mixing temperature being 70–75°C (wet or dry mixing) at a steam pressure of 2·1 atm. ± 0·35 atm. The briquettes have a dry solids content of 91·0% and carbohydrate content of 51·0% without molasses, and with 13% molasses a dry solids content of 91·7% and a carbohydrate content of 52·0%.

* * *

Technical problems with the application of fresh knowledge on the coke-fired shaft limekiln. F. HOFFMANN. *Zucker*, 1960, **13**, 517–521.—To reduce the fuel consumption of a shaft lime kiln the insulation of the kiln shell should be improved and the effective height increased. However, these measures would be effective only if the lining were sufficiently gas-tight and the burning zone kept horizontal at the appropriate height.

* * *

Deionization of beet juices. J. GENOTELLE. *Sucr. Belge*, 1960, **80**, 49–65.—Ion exchange is reviewed, including the theory of ion exchange, the constitution of exchange resins, their capacities, the mechanism of the exchange process, its application in the sugar factory and particularly for different products of the beet factory. Some details are given to demonstrate the results obtainable and the quantity of juice treated per cycle. Various well-known processes are described, including the Vajna, SCC, Quentin, and Assalini B processes. The results obtained in American factories in 1947 are compared with those obtained in French factories in 1958/59. While it is possible to treat at least 50% of the juice with the classical ion exchange on the H^+—OH^- cycle, the question of economics still remains all-important, although it is considered that the process could be made economical.

* * *

Lactic acid, protein and pectin in the raw juices during the 1959 campaign. S. WRAMSTEDT. *Socker Handl.* II, 1960, **16**, 7–16.—The raw juice from DdS, Buckau, RT and battery diffusers was compared. The lactic acid was separated by ion exchange according to the method of STARK *et al.*[1] and analysed colorimetrically by the Barker & Summerson method[2]. The lactic acid content of the juice from the DdS diffuser was very high and in the juice from the other continuous diffusers very low. The DdS lactic acid figure was probably due to initial difficulties and may be reduced by disinfecting the raw juice with formaldehyde at the juice end, by more effective steaming-out of such equipment at the juice end as the strainer, and by slightly increasing the diffusion temperature. Only in one of the battery diffusers was there a significant increase in the raw juice lactic acid content before predefecation. The juice temperature was 38–40°C, considered most critical for the lactic acid formation; disinfecting with chloride of lime and cleaning the pulp strainer eliminated the microbiological activity in the juice. Protein was precipitated from raw juice samples with 4 volumes of alcohol containing a little glacial acetic acid. The N content was determined after centrifuging and washing with alcohol. The protein content of the juice from the DdS and one Buckau diffuser was the same as in the battery juice. In the other Buckau diffuser the content was slightly higher, as in the RT, where the greater portion of the protein content was leached out in the scalding system. However, the protein content of the raw juice leaving the RT diffuser could not be established because of the pulp-catching system peculiar to the RT. The pectin leaching velocity was normal in one Buckau and the DdS diffuser, in the latter as a result of the low temperature. The other Buckau and the RT diffusers had very high velocities, attributed to the considerably higher temperatures of the circulating raw juice rather than the diffusion temperatures. Further research into the problem is advocated.

* * *

Problems of beet unloading. M. VILLAK. *Zuckerzeugung*, 1960, **4**, 300–302.—Some beet vehicle tippers of East German manufacure are described with diagrams.

* * *

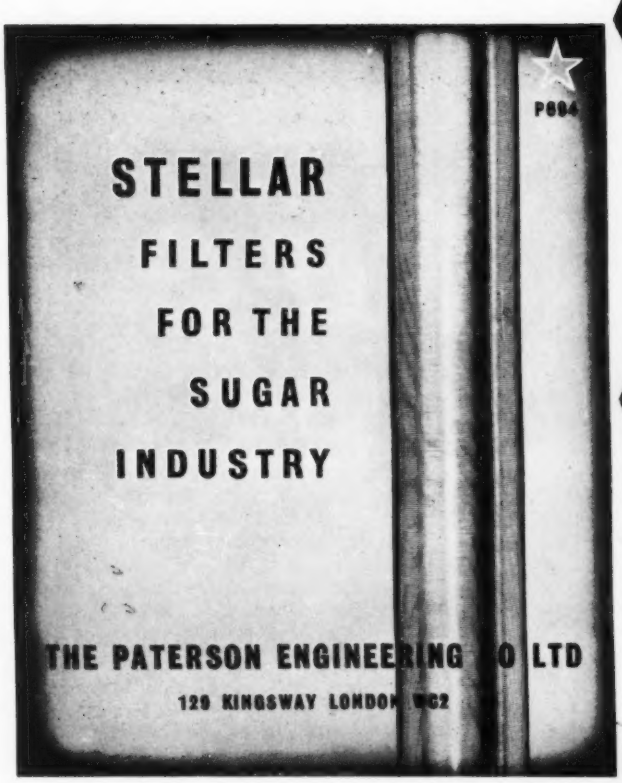
Operation of a DdS diffuser on the basis of results at Goslawice factory. M. TYCZEWSKI. *Zuckererzeugung*, 1960, **4**, 250–254, 317–318.—Further details are given of the diffuser and its controls[3].

* * *

The design, operation and economic evaluation of a gas-fired lime kiln. S. M. HEINER. *J. Amer. Soc. Sugar Beet Tech.*, 1960, **11**, 168–174.—An increase in the capacity of the Steffen plant at the Nyssa and Nampa factories of The Amalgamated Sugar Co. necessitated among other equipment a new lime kiln with a capacity of about 72 tons of lime per day. Details are given of the gas-fired multiple level side firing kiln, designed and patented by V. J. AZBE. The higher initial costs of the kiln have been offset by the saving in fuel costs. At present it is operated to produce 66 tons of lime per day.

[1] *J. Agric. Food Chem.*, 1953, **1**, 564–566.
[2] *J. Biol. Chem.*, 1941, **138**, 535–554.
[3] *See I.S.J.*, 1960, **62**, 21, 318.

YOU MUST SEE THIS



It's the *new* booklet about a new filtration technique . . . STELLAR In its pages are described and pictured the functions of Stellar Filters in the clarification and polishing of sugar syrups. You'll find it well worth reading. May we send you a free copy?

Write: Stellar Department
Paterson Engineering Co. Ltd.
129, Kingsway, London, W.C.2

Simazine

A new departure in weed control

One single pre-emergent application keeps young cane weed-free for months

persistent selective safe

Simazine products for weed control in sugar cane are available

in the USA and Puerto Rico through the distributors of Geigy Agricultural Chemicals, Ardsley, N.Y., as **Geigy Simazine 80 W**

in Central and South America, Cuba, Haiti, the Dominican Republic, South Africa, the Philippines and Taiwan through the local distributors of J. R. Geigy S.A., Basle (Switzerland), as **Gesatop 50 W**

in the British Commonwealth (other than Australia) through Fisons Chemicals (Export) Ltd., 95 Wigmore Street, London, W1, as **Simazine 50 W**

New Books and Bulletins

The Indian Sugar Industry 1958/59 Annual. M. P. GANDHI. cxix + 85 pp; $6\frac{1}{2} \times 9\frac{3}{4}$ in. (M. P. Gandhi & Co., Nanabhay Mansion, Sir Pherozshah Mehta Rd., Bombay 1, India.) 1960. Price: Rs. 6·00; Rs. 7·00 (12s. 0d.) post-free.

The general pattern of this, the 23rd volume, is similar to that of previous editions, with numerous tables of statistics on sugar consumption, prices, etc., and a general survey of the sugar supply position in the first part, and a review of the sugar industry in the second part. Data on gur and sugar production, machinery, labour, etc. are also given. It is a useful guide for all interested in the Indian sugar industry, but it is to be regretted that the list of new and existing sugar undertakings, published in previous editions, has been omitted.

* * *

Plantation Crops. 220 pp; $7\frac{1}{4} \times 9\frac{1}{2}$ in. (H.M. Stationery Office, Holborn Viaduct, London E.C.1.) 1960. Price: 10s. 0d.

This book is published for the Commonwealth Economic Committee and has been compiled by its Intelligence Branch. It is a review of production, trade, consumption and prices relating to sugar, tea, coffee, cocoa, spices, tobacco and rubber, and includes statistics up to 1958/59 and provisional data for 1959/60. The section on sugar occupies 26 pages, including a number of tables, while in the Appendices appear accounts of the International and Commonwealth Sugar Agreements, as well as Government measures affecting sugar production, imports, etc., in the U.K. and other member countries of the Commonwealth, together with export and import duties and cesses in effect on the 1st January 1960, in various countries of the world.

* * *

Official Methods of Analysis of the Association of Official Agricultural Chemists, 9th Edn. Ed. W. HORWITZ. 832 pp; $6\frac{3}{4} \times 10\frac{1}{4}$ in. (Association of Official Agricultural Chemists Inc., P.O. Box 540, Benjamin Franklin Station, Washington 4, D.C., U.S.A.) 1960. Price: $18.00.

This latest volume of "Official Methods" contains all revisions adopted by the Association up to its annual meeting in October 1959. It contains a tremendous number of techniques covering the entire range of products analysed by Association members from agricultural liming materials to waters. Apart from brewing sugars and syrups, covered under "Beverages", the section of most interest to our readers is "Sugar and Sugar Products" which occupies 31 pages of close type and covers sugars, syrups and molasses; confectionery; honey; maple products; sugar beets; and starch conversion products. Naturally there is little change in the methods given, but particularly noticeable changes include the Shaffer modification[1] of the Somogyi micro-method for dextrose, and the dropping of the Allihu gravimetric method. The book has been reset in a larger format with two columns; this makes for easier reading. The "modern" spelling is retained and may cause difficulty for chemists to whom English is not a mother tongue—words such as "thoroly" appear strange to an eye used to conventional spelling. A further drawback is the rather haphazard use and omission of stops to indicate abbreviations, for instance with "mixts", "dild" and "ca". The quality and style of printing are excellent, and the work as a whole is rendered very useful by the list of contents and a comprehensive index.

* * *

Sucrose ester surfactants. 17 pp; 4 × 7 in. (Sugar Research Foundation Inc., 52 Wall Street, New York 5, N.Y., U.S.A.) 1960.

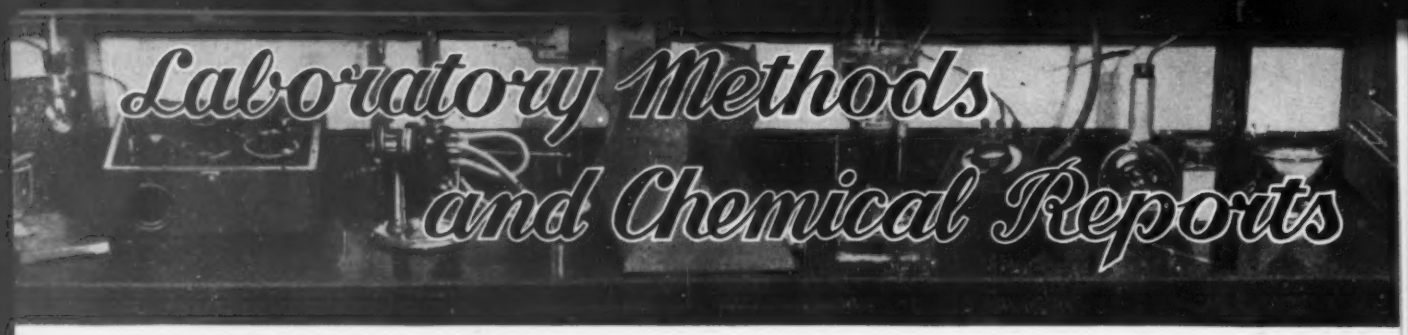
This small booklet is designed to answer questions about the sucrose ester surface active agents, and the processes by which they can be prepared. It describes the nature of surface active materials and shows how the sucrose esters fall into the non-ionic category. It describes the properties of these esters, their suggested uses and also discusses their cost and preparation, finally referring to patent rights and licensing. An appendix gives details of the laboratory preparation of sucrose mono- and di-stearates and other esters, while a second appendix is a bibliography of 56 references to the literature.

* * *

Proceedings of the 28th Annual Convention of the Sugar Technologists' Association of India, 1960. 241 pp; $7\frac{1}{4} \times 9\frac{1}{2}$ in. (The Sugar Technologists' Association of India, Nawabganj, Kanpur, U.P., India.) (In two parts.) 1960.

Both parts of the 28th Convention Proceedings start with a table of elected office bearers, staff, past presidents, patrons, and honorary fellows. This is followed by lists of contents and these by the texts of the papers presented at the Convention. Abstracts or reviews of these papers will appear in this *Journal* in due course.

[1] *J.A.O.A.C.*, 1959, **42**, 341; 1960, **43**, 645; *I.S.J.*, 1961, **63**, 56.



Reducing sugar methods. E. J. McDONALD and B. Y. FOLEY, *J.A.O.A.C.*, 1960, **43,** 645–649.—The Shaffer & Somogyi method[1] of reducing sugars determination using the so-called "carbonate 50" reagent containing 5 g KI has been found to give results for a concentration range of 10–50 mg/100 ml with an error of less than 2%, while a phosphate buffered reagent introduced by SOMOGYI has been found to have no advantage over the carbonate reagent. Results are tabulated of determinations of 5 aliquots, each at 8 different concentrations, of 10 different sugars, and thiosulphate-sugar relations are derived, represented by a straight line; for determination of the amount of sugar, the copper reduced is expressed in terms of 0·005 N thiosulphate.

* * *

Reconditioning calomel electrodes of pH meters. V. A. YAKIMOV. *Sakhar. Prom.*, 1960, (9), 32–33.—$CaCl_2$ is removed from the ceramic portion of calomel electrodes with a 50% acetic acid solution in a hot water bath at 75–80°C during 5–8 hr. The $CaCl_2$ inside the ceramic portion is removed in the same way, but also using compressed air at 0·5–0·7 kg/sq. cm. pressure to clean the pores.

* * *

A sensitive method for detecting sugars on paper chromatograms. J. K. ROY. *Analyst*, 1960, **85,** 284–295.—A 0·2% solution of each of several sugars was developed on filter paper with ethyl acetate: acetic acid: water (3 : 1 : 3), the paper dried, then sprayed with a 1% solution of *p*-aminobenzoic acid in *iso*butyl alcohol; the paper was again dried, then sprayed with a 0·5% solution of oxalic acid in *iso*butyl alcohol and heated at 105°C during 10 min. With 1μg amounts of sugars, the spots formed by glucose, galactose, mannose, xylose and rhamnose were detectable, although faint. When 4μg amounts were present, distinct spots were obtained additionally with raffinose, sucrose, lactose and fructose, having a pale greyish brown background and lasting for several days without fading.

* * *

Determination of small amounts of lactic acid in the presence of large amounts of sugar. K. VUKOV. *Elelmezési Ipar*, 1960, **14,** 91–93; through *S.I.A.*, 1960, **22,** Abs. 807.—The separation of lactic acid by means of ion exchangers, according to Stark, Goodban & Owens, was carried out with the use of Hungarian-produced ion exchangers. The actual lactic acid determination by the method of Barker & Summerson was modified by using chinoin (crude veratrole), instead of *p*-hydroxydiphenyl, in 3% concentration. The colour produced by the reaction was measured photometrically at 530 mμ. The method is applicable for amounts of >10 γ of lactic acid per ml of solution, but results are different at different times, so that calibration curves must be prepared. The results are not affected by up to 100 γ of citric, galacturonic or malonic acids, or 5 γ of sucrose. Excess sucrose must be washed out while the acid is held on the ion exchanger, and a carbonate-form of anion exchanger was found best. Proteins, if present, should first be removed by pre-treatment of the solution on a H-form cation exchanger, with good washing, and boiling of the solution to coagulate proteins. The analysis of beet juice is described in detail.

* * *

The configuration of the D-fructose component in cane sugar (sucrose). F. MICHEEL and L. TORK. *Chem. Ber.*, 1960, **93,** 1013–1020; through *S.I.A.*, 1960, **22,** Abs. 817.—From the reactions of the 2-fluoro-derivatives of D-fructose <2, 6> or of 1-methyl-D-fructose <2, 6> with aqueous alkali or sodium methylate, it has been found that in the strongly negatively-rotatory derivatives the substituents on the C-2 are in the *cis* position to the hydroxyl on C-3, and in the weakly negatively- or positively-rotatory derivatives the substituent on C-2 is *trans* to the hydroxyl group in C-3. With furanoid sugar derivatives the directions of rotation of the α- and β-forms are analogous to those of the pyranoid forms, and sucrose must therefore have the α-D-glycosyl group in the *cis* position to the C-3 hydroxyl of the fructose component.

* * *

Colour formation by thermal degradation of reducing sugars and reaction between reducing sugar and amino acids. C. C. TU, R. OKAMOTO and K. ONNA. *Proc. 18th Ann. Meeting, Hawaiian Sugar Tech.*, 1959, 112–115.—Solutions of glucose and glycine were heated at 80°C during 4½ hr at pH 4, 6·5 and 9. At pH 6·5 a reddish-brown colour formed, darkening at pH 9·0. Three aliquots from each of the three samples with pH adjusted to 4, 6·5 and 9·0 were analysed spectrophotometrically to determine the effect of pH on the colour; this was found to be very slight. An aqueous solution of sucrose acidified with HCl was inverted at 70°C during 5 min. The pH was adjusted to 11 and the solution refluxed for 10 hr. Precipitation occurred after several hours of heating, the final pH being 4·6. Electrophoresis revealed that a brown band similar to that of raw sugar crystal had migrated towards the cathode. Paper chromatograms indicated that fructose was almost completely decomposed and

[1] *J. Biol. Chem.*, 1933, **100,** 695.

Uniform clarity at the lowest cost with CELITE, DIATOMITE and PERLITE Filter-aids

From month to month, bag to bag, CELITE diatomite filter-aids have given you high quality, uniform results. Now our diatomite filter-aids have been joined by a range of Perlite filter-aids, which, because of their lower densities can be used even more sparingly and therefore more economically than diatomite.

CELITE, diatomite and Perlite filter-aids remove suspended colloids and thermophilic bacteria from cane and beet sugar at the fastest flow rates obtainable. As a result, costly fouling of char or activated carbon is greatly reduced.

For further information about CELITE, diatomite and Perlite, write Johns-Manville International Corp., Box 60, New York 16, N.Y., U.S.A. *For England and Continental Europe:* Johns-Manville Co. Ltd., 20, Albert Embankment, London, S.E.11. *Tel.:* REL 6464–7.

JOHNS-MANVILLE

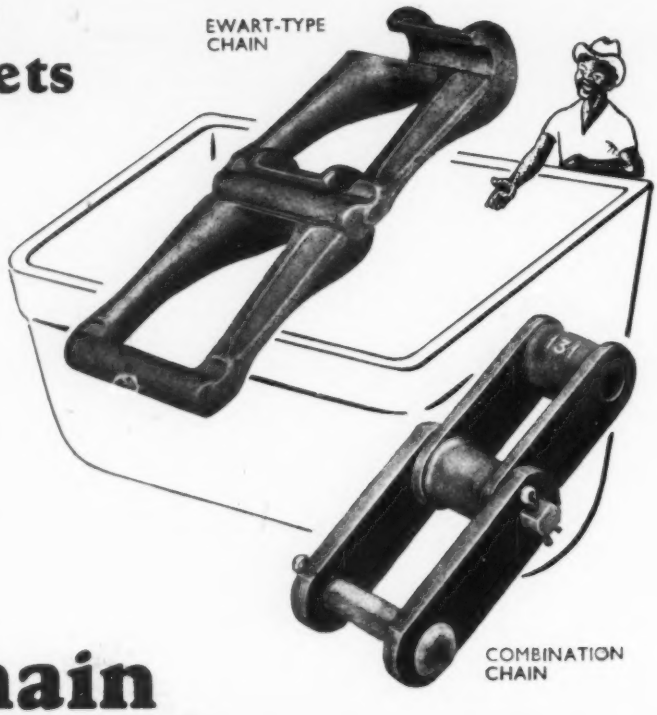
JOHNS MANVILLE JM PRODUCTS

THRO' THE MILL—ON PENNINE CHAIN

Carrying buckets

Pennine make two chains suitable for bucket elevator service. The popular and widely used No. 88 Ewart-type detachable chain for normal service is easily assembled and uncoupled because of its hook construction. This chain must be run with the sprocket against the closed side of the hook.

A stronger chain also recommended for this work is Pennine Combination Chain—a combination of malleable iron centre-links and high-carbon steel side-bars. Both these chains require K1 or K2 links spaced at intervals for elevator bucket attachment.

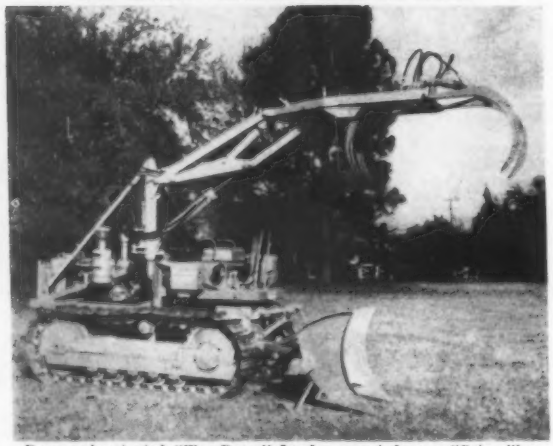


Sugar production runs smoother on

Pennine chain

Catalogues on request: PENNINE CHAINBELT CO. LTD., ARMLEY, LEEDS 12, ENGLAND

SUGAR CANE LOADERS



Broussard patented "Flex-Boom" Loader mounted on a "Caterpillar D-4 crawler tractor, with push piler for Puerto Rico.

Capacity 2000 lb/minute (Under Louisiana conditions), grab capacity (54 in. opening) 1500 lb., load clearance 12 ft., loading radius 10 ft. to 12 ft., boom swing, front to right, 100°.
The Broussard heavy duty tropical type loader is also available for installation on the Track-Marshall, International TD-9, Allis-Chalmers HD-6, John Deere 440 crawler, Fordson-Major and International B 450 as well as various USA wheel tractors.
Extremely simple in design with few wearing parts and with perfect operator visibility on both wheel and crawler tractor installations, the Broussard Loader may be easily installed at the destination on tractors already in hand and quickly removed at the close of the harvest.

Manufactured by
BROUSSARD MACHINE COMPANY
ST. MARTINVILLE, LOUISIANA

Export Division
LOGAN PERKINS LTD.—SUGAR MACHINERY
P.O. Box 123, Nassau, Bahamas.

We have sold our patented

SUGAR TABLET OR CUBE INSTALLATIONS

all over the world.

Cubes from dry granulated

The small machine with the big output!

Automatic packing equipment if desired

Very low capital outlay

Send for information to:

GOKA N.V.
MACHINE WORKS

Established 21 years
AMSTERDAM
HOLLAND
P.O. Box No. 130
Tel: 222255–222256
Telex: 14173 "Kagodam"
Cables: "Kagodam"

a considerable amount of glucose remained unchanged. Both solution and precipitate (alkali-soluble) contained a group of acids similar to those found in raw sugar crystal. pH changes had a greater effect on colour than with the melanoidins, an increase causing intensification of the brown colour. It was found that at the start of thermal degradation the maximum transmittance occurred at 240–250 m and minimum at 270–290 m, indicating the presence of a carbonyl group with one or more conjugated double bonds in the degradation products. As the thermal degradation proceeded, the peaks changed from u.-v. to the visible spectrum, and several acidic substances were found, suggesting oxidation during degradation and colour formation. Transmittance curves show that the colouring substances in raw sugar appear qualitatively the same as those of the thermal degradation products of reducing sugars.

* * *

Sucrose solubility. II. Is there a discontinuity in the solubility curve? G. VAVRINECZ. *Cukoripar*, 1960, **13**, 248–250.—Reference is made to the solubility determinations of Kelly[1], who found that at about 40°C there is a discontinuity in the solubility curve for sucrose in water. Graphs are presented of the deviation of solubility determination made by various authors from values calculated, with the help of a tertiary equation:
($p = 65{\cdot}542 + 0{\cdot}07983t + 0{\cdot}0019658t^2 - 0{\cdot}000009691t^3$), over the range 0–100°C. The data of Kelly agree well with the tertiary equation with a mean deviation of ±0·003, although the equation does not show any discontinuity at 40°C.

* * *

Laboratory experiments on molasses exhaustion. R. CAROLAN. *Irish Sugar Co. Ltd. Research Lab. Rpt.*, 1960, (43), 42 pp. + Suppt. 2 pp.—Laboratory tests on exhaustion of molasses from the 1959/60 campaign at the four Irish Sugar Co. factories are discussed. The average apparent purity of 60·0 was reduced after one day to 54·4 and after one week to 53·2, using Grut's method[2] in a laboratory crystallizer, 20% seed being used instead of 40% to facilitate syrup separation. All tests were carried out at 40°C. The ratio of moles pol-sugar:atoms of K, Na and Ca fell from an average of 1·37 to 1·03 after one week's crystallization (the results of 25 samples were spread over a range of 0·88–1·14). When KCl was added to the molasses, the sugar/(K + Na + Ca) ratio was lower than for the un-treated molasses. In the case of NaCl addition, no conclusions can be drawn from the higher sugar/(K + Na + Ca) ratio of the un-treated molasses, as the test was complicated by the simultaneous presence of invert sugar. When sodium acetate was added (16% on molasses) it was found that the acetate was as melassigenic as the sodium salts naturally occurring in the beet, while the K in K citrate is as melassigenic as the K or Na indigenous to beet. Ca acetate is a little less melassigenic than K or Na. Active carbon (150 g) and animal charcoal (300 g) were added to 750 g of molasses, which was diluted to 50°Bx, heated at 50°C during 10 min, filtered, evaporated and crystallized. Carbon in great excess raised the purity of both original and exhausted molasses by about 5 units, but only about a quarter of the Na was removed. Betaine alone was found to be non-melassigenic, although earlier a mixture of KCl and betaine had been found to be melassigenic to the same extent as a K salt of a weak acid or the natural salts in beet. Molasses diluted to 70·8°Bx and of pH 5·1 was stored for some months, the pol falling to 34·5 and the invert increasing to 12·7%. The high sugar/(K + Na + Ca) ratio (2·20) and the nitrogen content of only half the normal figure indicated that half of the sugar in the molasses was crystallizable. Invert sugar was found to have little or no effect on molasses exhaustion, at least under the test conditions, although by replacing sucrose in the sugar-ash complex it can form an uncrystallizable complex.

* * *

The effects of ionizing radiations on carbohydrates and related substances. L. J. MCCABE. *Diss. Abstr.*, 1960, **20**, 3957; through *S.I.A.*, 1960, **22**, Abs. 818.—Sucrose, irradiated as a powder or in 30% solution by cathode rays, γ-rays or soft X-rays, was hydrolyzed to glucose and fructose to an extent varying with the dosage for aqueous solutions, but reaching a maximum at an intermediate dosage for powdered sucrose. The X-rays caused much less decomposition than that produced by the cathode or γ-rays. Tests at the temperatures of the air, of ice and water, and of solid CO_2-ethanol showed greatest hydrolysis at the lowest temperature. About 10% of non-reducing substances were also produced. Methyl-α-D-glucopyranoside was hydrolyzed to D-glucose; sorbitol and mannitol were oxidized to glucose, arabinose and xylose and to mannose and arabinose, respectively. D-Glucose and D-fructose were decomposed by cathode rays to arabinose and other sugars. Irradiation tests were also made on starches, and glucose-glycine (Maillard browning reaction) mixtures; browning in the latter was increased.

* * *

Study on the relationship between non-sucrose constituents and crystal size. K. ONNA, C. C. TU and G. AKATSUKA. *Proc. 18th Ann. Meeting, Hawaiian Sugar Tech.*, 1959, 111–112.—Graphs are presented of transmittance at 420 mμ *vs.* sugar crystal size and of conductivity *vs.* crystal size for sugars from three Hawaiian factories. Sucrose crystals (20 g) were dissolved in 50 ml of water, the solution clarified and the transmittance measured with a Beckman spectrophotometer. Sucrose crystals from another factory were refluxed in 1 litre of 85% methanol and the percentage insoluble substances precipitated are tabulated. It was found that colour, conductivity, and alcohol-insoluble substances decrease with reducing crystal size, thus indicating that impurities are largely present in inclusions, which is related to crystal growth size.

[1] *I.S.J.*, 1958, **60**, 320–322.
[2] *I.S.J.*, 1954, **56**, 19.

BY-PRODUCTS

Studies on sugar cane bagasse. II. Sorption studies and density data of bagasse and its fractions. S. R. PATHAK and V. R. SRINIVASAN. *Indian Pulp & Paper*, 1959, **13**, 547–550; through *S.I.A.*, 1960, **22**, Abs. 696.—The sorptive capacity of cellulosic materials is usually a function of their amorphous regions and can be taken as an approximate relative measure of these regions. Bagasse fibre and pith were separated, and samples were extracted with alcohol-benzene as before (*see I.S.J.*, 1960, **62**, 328); some pith was tested without extraction and also after both alcohol-benzene and hot water extraction. The samples were fully dried over conc. H_2SO_4 in desiccators, and were then submitted to a series of increasing humidities of 20 to 70% (and more) R.H. at 27°C, being weighed until equilibrium was established at each step; when 100% R.H. had been reached, the samples were put in desiccators of successively lower humidity until dryness was again reached. The value of % moisture regain are tabulated and shown graphically. The curves are similar to those for other cellulosic materials; the moisture sorption rises from 70 to 100% R.H. and vice-versa. Improved separation of pith from fibre may thus be possible by dry processing methods if the bagasse has been stored at humidities below 70% R.H. The sorptive capacity was lowest in alcohol-benzene extracted fibre, and highest in alcohol-benzene extracted pith (water treatment reduced this value considerably). Whole bagasse has a lower sorption ratio than that of other cellulosic material. The apparent densities of fibre and pith were determined and the values showed a significant difference. The values for fibre samples were fairly uniform (1·194–1·258), but those of the pith samples varied more widely (0·938–1·203).

* * *

Strawboard from sugar cane bagasse. M. M. SINGH. *Indian Pulp & Paper*, 1959, **14**, 295–296; through *S.I.A.*, 1960, **22**, Abs. 698.—Bagasse with 58·65% cellulose content, and dried to 10% moisture, was digested by the lime process and processed to strawboard sheets. Results after the use of different amounts of lime (10 to 15%) and for varying times at different temperatures are tabulated. Strawboard with good strength properties could be prepared with a 70% yield, and the pulps were better than those from ulla or panni grass, wheat straw or rice straw.

* * *

Obtaining araban from sugar beet pulp with the use of ion exchange resins. T. K. GAPONENKOV, T. K. STANISLAVSKAYA and Z. A. IVANOVA. *Zhurn. Priklad. Khim.*, 1960, **33**, 494–496.—Araban was recovered from beet pulp pectin by dissolving it in aqueous alcohol and precipitating the salts of pectic acid. After filtering and distilling off the alcohol, an aqueous solution of araban remained with a mixture of pectic acid and ash. The araban solution was purified by passing through an EDE-10 anion exchanger in the OH^- form and a KU-1 cation exchanger in the H^+ form, evaporated and the araban precipitated with 96% alcohol. The precipitate was filtered, washed with alcohol, then treated with ether for some days, filtered, washed with ether and dried to yield 23–25% araban on the original pectin. Purification of the araban obtained direct from beet pulp, as above but omitting the pectin separation, gave a 5–6% yield on pulp.

* * *

Study of the technological conditions in obtaining food pectin from (beet) pulp. I. M. LITVAK and M. I. BARABANOV. *Trudy Kiev. Tekhnol. Inst. Pishch.Prom.*, 1959, **21**, 3–10.—Experimental data presented and optimum pulp hydrolysis conditions recommended for recovery of the maximum amount of food pectin (15–16% on weight of dry pulp) with good jellifying properties. These are: 2–3 hr hydrolysis at 60°C and 25·5% HCl on weight of pulp, or 2–3 hr hydrolysis at 70°C with 16·2% HCl on weight of dry pulp. On the basis of the results, a factory scheme has been worked out for pectin recovery, suitable also for obtaining pectin glue. Details of the scheme are given with a flow-sheet.

* * *

Sugarcane as a pasture supplement during the winter for yearling cattle. C. E. HAINES and F. LE GRAND. *Sugar J.* (La.), 1960, **23**, (4), 13–15.—The weights of yearling cattle fed with 15 lb/day of chopped sugar cane for 10 weeks in addition to feeding on three types of grass were compared with those of cattle not given additional cane feed. The supplements were of benefit in that they either reduced the winter weight losses or increased the rate of gains depending on the type of grass.

* * *

Blackstrap and ground snapped corn compared in wintering rations. E. G. GODBEY and R. L. EDWARDS. *Sugar J.* (La.), 1960, **23**, (4), 21–26.—Milch cows and beef cows in calf were fed on winter rations of corn, 50% corn and 50% molasses, and all molasses. Results were satisfactory, there being no distinct differences in the weights for the three diets. Steer calves fed on rations containing cottonseed hulls, cottonseed meal, and 3 lb of ground snapped corn or blackstrap molasses showed practically identical gains in weight (0·83–4 lb/day). In all the tests the molasses feed was very slightly dearer than the corn.

* * *

Can Gulf cattlemen not afford blackstrap as pasture supplement? S. L. CROCHET. *Sugar J.* (La.), 1960, **23**, (4), 27–29.—The use of blackstrap molasses as a fodder supplement is highly recommended by the author, who is Vice-President, Sales and Cattle Project, U.S. Sugar Corporation.

* * *

New yeast production process. J. TOMISEK. *Kvasny Prumysl*, 1960, **6**, (4), 81; through *Brit. Chem. Eng.*, 1960, **5**, 758.—In the new continuous process described[1] orthophosphoric acid is used as a source of

[1] Czech. Pat. PV 7505/59.

P_2O_5. The broth prepared from molasses and ammonia liquor is clear, and after dilution in the fermenter all impurities remain in solution. Full-scale tests have shown the raw material costs to be 20% lower than previous processes despite the higher cost of P_2O_5 from orthophosphoric acid compared with superphosphate. H_2SO_4 is not required, ammonia liquor is cheaper than ammonium phosphate and losses of available P_2O_5 for fermentation are very low. Other advantages are enumerated, and the yeast is of good colour, very active and has good keeping qualities. The dilute molasses is passed through a heat exchanger in counterflow against hot molasses from a plate-type steam heater, and the molasses so cooled is centrifuged, then stored before automatic metering to the fermenters.

* * *

Mycological production of citric and oxalic acids from cane molasses. I. Effects of some cultural conditions and supplements of ferrocyanide and phosphate. I. R. SHIMI and M. S. NOUR EL DEIN. *J. Sci. Food Agric.*, 1960, **11**, 592–600.—The effects were studied of cultural conditions and of the presence of ferrocyanide and/or phosphate supplements on the biosynthesis of citric and oxalic acids from cane molasses in surface cultures of *Aspergillus niger*. Sodium nitrate, and ammonium nitrate, sulphate, phosphate and chloride were added to dilute blackstrap molasses solutions. The organic acids biosynthesized were identified by one-dimensional chromatography after different incubation periods. Ammonium nitrate was the best compound for the production of acids, the optimum molasses sugar concentration being 15%. The accumulation of citric acid was stimulated at initial acidic pH values, while that of oxalic acid was retarded; the reverse occurred at alkaline pH values. Increasing phosphate concentration up to 0·1% increased citric acid yields and suppressed oxalic acid formation. Ferrocyanide has the same effect as phosphate; when ferrocyanide and phosphate were present, their suppressing effect on oxalic acid was greater than when only one was present. The two together had a synergistic stimulating effect on citric acid formation. The complex nature of the molasses disturbed the metabolic activities of the moulds so that intermediates of the tricarboxylic acid cycle accumulated in the metabolism solutions. Citric and oxalic acid yields fell while that of gluconic acid increased. In synthetic cultures, higher citric and oxalic acid yields were detected but no intermediates, except traces of malic and pyruvic acids which appeared after a long incubation period.

* * *

Sucrose as a possible raw material for the chemical industry. E. HIRSCH. *Chem. Ztg.*, 1959, **83**, 249–254; through *S.I.A.*, 1960, **22**, Abs. 888.—A survey is given with 20 references of the decomposition of sucrose to levulinic acid, the product of dextran, acetone, butanol, and various organis acids by fermentation, the preparation of sucrose ethers and esters, and of alkali saccharates, and hydrogenation and condensation products.

Replacement of sulphuric acid with bagasse ash in ethanol fermentation of waste molasses. A. A. MUJEEB and S. VASUDEVAN. *Sharkara*, 1960, **3**, 76–82.—Laboratory and large-scale experiments were conducted on ethanol fermentation using bagasse ash instead of sulphuric acid to adjust the pH in the fermenters. It was found that the insoluble solids portion of bagasse ash after cold water extraction was more effective than whole bagasse ash or its water-soluble extract in reducing the bacterial counts at the top of the fermenter; the bacterial count at the bottom of the fermenter was higher than with the other preparations. The bagasse ash is cheaper. Its action is considered to be physical rather than chemical.

* * *

Preparation of dissolving pulp from sugar cane bagasse. A. H. LOCUS. *Tappi*, 1960, **43**, 11–15; through *S.I.A.*, 1960, **22**, Abs. 901.—High-grade experimental pulps for the production of viscose rayon were prepared from depithed bagasse by the prehydrolysis sulphate process. A study of hydrolyses by H_2SO_4, HNO_3, water and steam is reported. The effectiveness of pentosan removal depends upon the conditions of hydrolysis. The yield of the pulp from bagasse was about 33%, which is comparable to that from wood, and the pulps were of satisfactory quality, having high brightness, <4% pentosan, >95% α-cellulose and 0·1% or less ash, when hydrolyzed with steam, pulped with Kraft chemical and bleached in seven stages.

* * *

The chemistry of sugar cane wax. I. The nature of sugar cane wax. J. A. LAMBERTON and A. H. REDCLIFFE. *Austral. J. Chem.*, 1960, **13**, 261–268; through *S.I.A.*, 1960, **22**, Abs. 902.—Sugar cane cuticle wax was distilled as a colourless oil at 220–235°C under reduced pressure (0·5 mm). Infra-red absorption spectra show the presence of long-chain aldehydes, which were readily converted to 2,4-dinitrophenylhydrazones, semicarbazones and oximes. The remainder consists of long-chain alcohols (ca. 30%), long-chain acids (ca. 10%) and hydrocarbons (ca. 6%). The formation of aldehydes, and not ketones, on distillation is discussed. After heating with an alcoholic KOH solution the acidic and unsaponifiable fractions were separated according to the method of Horn and Matic and analyzed. The hydroxyl and iodine values also indicate the presence of aldehydes. Heating of a partially polymerized dodecanal gives a product with an infra-red absorption spectrum similar to that of the unsaponifiable fraction. The acids and alcohols are considered to be formed by a Cannizzaro reaction, and the non-distillable fraction by an aldol condensation reaction and dehydration. Esters were not detected. Heating of the wax in air causes rapid oxidation. The presence of aldehydes in other vegetable waxes is discussed. The easy oxidation and conversion of sugar cane cuticle wax to free aldehydes shows the need for rapid separation of the wax from sugar cane muds.

BY-PRODUCTS

Studies on sugar cane bagasse. II. Sorption studies and density data of bagasse and its fractions. S. R. PATHAK and V. R. SRINIVASAN. *Indian Pulp & Paper*, 1959, **13**, 547–550; through *S.I.A.*, 1960, **22**, Abs. 696.—The sorptive capacity of cellulosic materials is usually a function of their amorphous regions and can be taken as an approximate relative measure of these regions. Bagasse fibre and pith were separated, and samples were extracted with alcohol-benzene as before (*see I.S.J.*, 1960, **62**, 328); some pith was tested without extraction and also after both alcohol-benzene and hot water extraction. The samples were fully dried over conc. H_2SO_4 in desiccators, and were then submitted to a series of increasing humidities of 20 to 70% (and more) R.H. at 27°C, being weighed until equilibrium was established at each step; when 100% R.H. had been reached, the samples were put in desiccators of successively lower humidity until dryness was again reached. The value of % moisture regain are tabulated and shown graphically. The curves are similar to those for other cellulosic materials; the moisture sorption rises from 70 to 100% R.H. and vice-versa. Improved separation of pith from fibre may thus be possible by dry processing methods if the bagasse has been stored at humidities below 70% R.H. The sorptive capacity was lowest in alcohol-benzene extracted fibre, and highest in alcohol-benzene extracted pith (water treatment reduced this value considerably). Whole bagasse has a lower sorption ratio than that of other cellulosic material. The apparent densities of fibre and pith were determined and the values showed a significant difference. The values for fibre samples were fairly uniform (1·194–1·258), but those of the pith samples varied more widely (0·938–1·203).

* * *

Strawboard from sugar cane bagasse. M. M. SINGH. *Indian Pulp & Paper*, 1959, **14**, 295–296; through *S.I.A.*, 1960, **22**, Abs. 698.—Bagasse with 58·65% cellulose content, and dried to 10% moisture, was digested by the lime process and processed to strawboard sheets. Results after the use of different amounts of lime (10 to 15%) and for varying times at different temperatures are tabulated. Strawboard with good strength properties could be prepared with a 70% yield, and the pulps were better than those from ulla or panni grass, wheat straw or rice straw.

* * *

Obtaining araban from sugar beet pulp with the use of ion exchange resins. T. K. GAPONENKOV, T. K. STANISLAVSKAYA and Z. A. IVANOVA. *Zhurn. Priklad. Khim.*, 1960, **33**, 494–496.—Araban was recovered from beet pulp pectin by dissolving it in aqueous alcohol and precipitating the salts of pectic acid. After filtering and distilling off the alcohol, an aqueous solution of araban remained with a mixture of pectic acid and ash. The araban solution was purified by passing through an EDE-10 anion exchanger in the OH^- form and a KU-1 cation exchanger in the H^+ form, evaporated and the araban precipitated with 96% alcohol. The precipitate was filtered, washed with alcohol, then treated with ether for some days, filtered, washed with ether and dried to yield 23–25% araban on the original pectin. Purification of the araban obtained direct from beet pulp, as above but omitting the pectin separation, gave a 5–6% yield on pulp.

* * *

Study of the technological conditions in obtaining food pectin from (beet) pulp. I. M. LITVAK and M. I. BARABANOV. *Trudy Kiev. Tekhnol. Inst. Pishch.Prom.*, 1959, **21**, 3–10.—Experimental data presented and optimum pulp hydrolysis conditions recommended for recovery of the maximum amount of food pectin (15–16% on weight of dry pulp) with good jellifying properties. These are: 2–3 hr hydrolysis at 60°C and 25·5% HCl on weight of pulp, or 2–3 hr hydrolysis at 70°C with 16·2% HCl on weight of dry pulp. On the basis of the results, a factory scheme has been worked out for pectin recovery, suitable also for obtaining pectin glue. Details of the scheme are given with a flow-sheet.

* * *

Sugarcane as a pasture supplement during the winter for yearling cattle. C. E. HAINES and F. LE GRAND. *Sugar J.* (La.), 1960, **23**, (4), 13–15.—The weights of yearling cattle fed with 15 lb/day of chopped sugar cane for 10 weeks in addition to feeding on three types of grass were compared with those of cattle not given additional cane feed. The supplements were of benefit in that they either reduced the winter weight losses or increased the rate of gains depending on the type of grass.

* * *

Blackstrap and ground snapped corn compared in wintering rations. E. G. GODBEY and R. L. EDWARDS. *Sugar J.* (La.), 1960, **23**, (4), 21–26.—Milch cows and beef cows in calf were fed on winter rations of corn, 50% corn and 50% molasses, and all molasses. Results were satisfactory, there being no distinct differences in the weights for the three diets. Steer calves fed on rations containing cottonseed hulls, cottonseed meal, and 3 lb of ground snapped corn or blackstrap molasses showed practically identical gains in weight (0·83–4 lb/day). In all the tests the molasses feed was very slightly dearer than the corn.

* * *

Can Gulf cattlemen not afford blackstrap as pasture supplement? S. L. CROCHET. *Sugar J.* (La.), 1960, **23**, (4), 27–29.—The use of blackstrap molasses as a fodder supplement is highly recommended by the author, who is Vice-President, Sales and Cattle Project, U.S. Sugar Corporation.

* * *

New yeast production process. J. TOMISEK. *Kvasny Prumysl*, 1960, **6**, (4), 81; through *Brit. Chem. Eng.*, 1960, **5**, 758.—In the new continuous process described[1] orthophosphoric acid is used as a source of

[1] Czech. Pat. PV 7505/59.

P_2O_5. The broth prepared from molasses and ammonia liquor is clear, and after dilution in the fermenter all impurities remain in solution. Full-scale tests have shown the raw material costs to be 20% lower than previous processes despite the higher cost of P_2O_5 from orthophosphoric acid compared with superphosphate. H_2SO_4 is not required, ammonia liquor is cheaper than ammonium phosphate and losses of available P_2O_5 for fermentation are very low. Other advantages are enumerated, and the yeast is of good colour, very active and has good keeping qualities. The dilute molasses is passed through a heat exchanger in counterflow against hot molasses from a plate-type steam heater, and the molasses so cooled is centrifuged, then stored before automatic metering to the fermenters.

* * *

Mycological production of citric and oxalic acids from cane molasses. I. Effects of some cultural conditions and supplements of ferrocyanide and phosphate. I. R. SHIMI and M. S. NOUR EL DEIN. *J. Sci. Food Agric.*, 1960, **11**, 592–600.—The effects were studied of cultural conditions and of the presence of ferrocyanide and/or phosphate supplements on the biosynthesis of citric and oxalic acids from cane molasses in surface cultures of *Aspergillus niger*. Sodium nitrate, and ammonium nitrate, sulphate, phosphate and chloride were added to dilute blackstrap molasses solutions. The organic acids biosynthesized were identified by one-dimensional chromatography after different incubation periods. Ammonium nitrate was the best compound for the production of acids, the optimum molasses sugar concentration being 15%. The accumulation of citric acid was stimulated at initial acidic pH values, while that of oxalic acid was retarded; the reverse occurred at alkaline pH values. Increasing phosphate concentration up to 0·1% increased citric acid yields and suppressed oxalic acid formation. Ferrocyanide has the same effect as phosphate; when ferrocyanide and phosphate were present, their suppressing effect on oxalic acid was greater than when only one was present. The two together had a synergistic stimulating effect on citric acid formation. The complex nature of the molasses disturbed the metabolic activities of the moulds so that intermediates of the tricarboxylic acid cycle accumulated in the metabolism solutions. Citric and oxalic acid yields fell while that of gluconic acid increased. In synthetic cultures, higher citric and oxalic acid yields were detected but no intermediates, except traces of malic and pyruvic acids which appeared after a long incubation period.

* * *

Sucrose as a possible raw material for the chemical industry. E. HIRSCH. *Chem. Ztg.*, 1959, **83**, 249–254; through *S.I.A.*, 1960, **22**, Abs. 888.—A survey is given with 20 references of the decomposition of sucrose to levulinic acid, the product of dextran, acetone, butanol, and various organis acids by fermentation, the preparation of sucrose ethers and esters, and of alkali saccharates, and hydrogenation and condensation products.

Replacement of sulphuric acid with bagasse ash in ethanol fermentation of waste molasses. A. A. MUJEEB and S. VASUDEVAN. *Sharkara*, 1960, **3**, 76–82.—Laboratory and large-scale experiments were conducted on ethanol fermentation using bagasse ash instead of sulphuric acid to adjust the pH in the fermenters. It was found that the insoluble solids portion of bagasse ash after cold water extraction was more effective than whole bagasse ash or its water-soluble extract in reducing the bacterial counts at the top of the fermenter; the bacterial count at the bottom of the fermenter was higher than with the other preparations. The bagasse ash is cheaper. Its action is considered to be physical rather than chemical.

* * *

Preparation of dissolving pulp from sugar cane bagasse. A. H. LOCUS. *Tappi*, 1960, **43**, 11–15; through *S.I.A.*, 1960, **22**, Abs. 901.—High-grade experimental pulps for the production of viscose rayon were prepared from depithed bagasse by the prehydrolysis sulphate process. A study of hydrolyses by H_2SO_4, HNO_3, water and steam is reported. The effectiveness of pentosan removal depends upon the conditions of hydrolysis. The yield of the pulp from bagasse was about 33%, which is comparable to that from wood, and the pulps were of satisfactory quality, having high brightness, <4% pentosan, >95% α-cellulose and 0·1% or less ash, when hydrolyzed with steam, pulped with Kraft chemical and bleached in seven stages.

* * *

The chemistry of sugar cane wax. I. The nature of sugar cane wax. J. A. LAMBERTON and A. H. REDCLIFFE. *Austral. J. Chem.*, 1960, **13**, 261–268; through *S.I.A.*, 1960, **22**, Abs. 902.—Sugar cane cuticle wax was distilled as a colourless oil at 220–235°C under reduced pressure (0·5 mm). Infra-red absorption spectra show the presence of long-chain aldehydes, which were readily converted to 2,4-dinitrophenylhydrazones, semicarbazones and oximes. The remainder consists of long-chain alcohols (ca. 30%), long-chain acids (ca. 10%) and hydrocarbons (ca. 6%). The formation of aldehydes, and not ketones, on distillation is discussed. After heating with an alcoholic KOH solution the acidic and unsaponifiable fractions were separated according to the method of Horn and Matic and analyzed. The hydroxyl and iodine values also indicate the presence of aldehydes. Heating of a partially polymerized dodecanal gives a product with an infra-red absorption spectrum similar to that of the unsaponifiable fraction. The acids and alcohols are considered to be formed by a Cannizzaro reaction, and the non-distillable fraction by an aldol condensation reaction and dehydration. Esters were not detected. Heating of the wax in air causes rapid oxidation. The presence of aldehydes in other vegetable waxes is discussed. The easy oxidation and conversion of sugar cane cuticle wax to free aldehydes shows the need for rapid separation of the wax from sugar cane muds.

UNITED KINGDOM

Sugar cane mills. SOC. FIVES LILLE-CAIL, of Paris 8e, France. **849,727.** 26th June 1959; 28th September 1960.—Drive to a three-roller mill is effected to the shaft of one of the bottom rollers (the delivery roller) the position of the axis of which is fixed. The upper roller moves upwardly against hydraulic pressure relatively to the lower fixed roller, while the other bottom roller (the feed roller) is adjustable to vary the feed opening of the mill. Drive from the fixed shaft is transmitted to the top roller shaft, and from this to the adjustable bottom roller shaft.

* * *

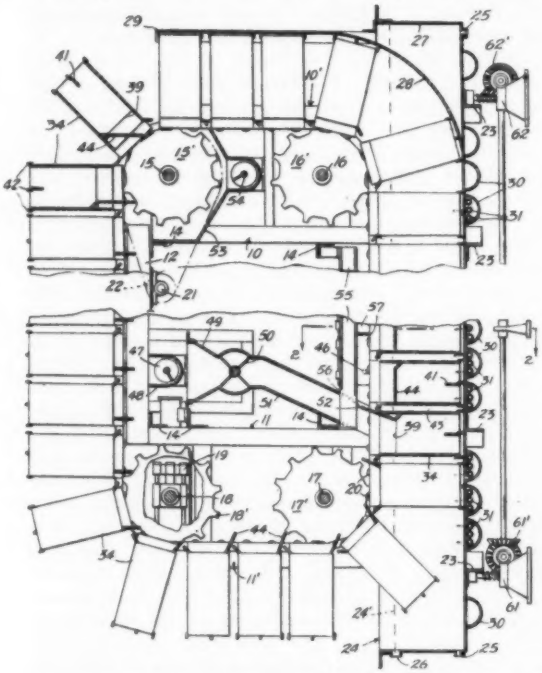
Beet harvesters. (1) J. SALMON, of Dunmow, Essex. **857,803.** 6th August 1959; 4th January 1961. (2) C. VAN DER LELY, of Maasland, Netherlands. **857,826; 857,287.** 1st July 1957; 4th January 1961.

* * *

Sugar esters. E. F. DREW & CO. INC., of New York, N.Y., U.S.A. **858,440.** 7th November 1958; 11th January 1961.—A mono or disaccharide, e.g. sucrose, (1 part) is dissolved in water (1–0·5 parts) to give a concentrated syrup and this made alkaline (pH 8–11) by addition of an alkali metal hydroxide, carbonate or bicarbonate, added as a (50%) aqueous solution. The temperature is maintained by cooling at or below 50°C while sufficient is added of an acid chloride of an alkyl carboxylic acid having 8–22 C atoms/molecule to combine with all the hydroxyl groups of the saccharide (equimolecular positions). The reaction product is filtered off and contains partial sugar esters and soap. The esters may be recovered after extracting with an organic solvent in which soap is insoluble, or the product may be acidified to convert the soap to fatty acid which is then extracted by a solvent in which the esters are insoluble.

UNITED STATES

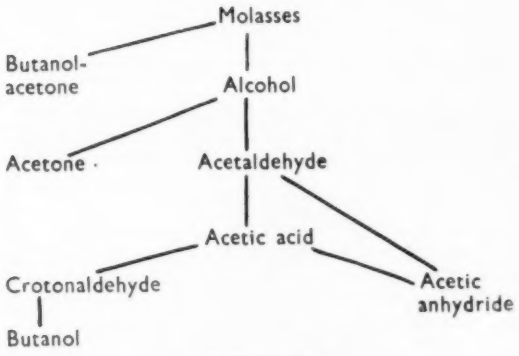
Continuous cane diffuser. A. F. DE LA CALLE, of Mexico 5, D.F. **2,953,485.** 28th April 1959; 20th September 1960.—The apparatus illustrated is drawn on its side, it being mounted on jacks 61, 62 which form the base. It comprises a frame with end pieces 10, 10′, 11, 11′, horizontal members 12 and crossframe members 14. The frame supports a driven shaft 15 and three idlers 16, 17, 18, the last having an adjustable support 19 to maintain tension in the endless chains 20 carried by the sprockets 15′, 16′, 17′ and 18′ at each end of the appropriate shafts. Underneath the frame is a tank 24 with a drain 25 and juice discharge 26, water being introduced at the end 27. A false bottom wall 28 extends upwardly from the tank, forming the vertical wall 29. Under the tank, and communicating with it by suitable apertures are steam chambers 30 which also contain compressed air discharge pipes 31. Coupled to the chains 20 are a series of open-topped and open-bottomed elements 34 formed by perforated end walls and divided into pockets by partitions 39. A transverse baffle strip 41 ensures upward movement of the cane chips in each pocket, and flexible sealing strips 42 prevent displacement of the chips from the pockets into the spaces between elements 34. Pivoted lids 44 at the top of each element, together with the flanged end of the opposite wall are so arranged that cane chips delivered to the diffuser by way of screw



conveyor 47, hopper 49, paddle feeder 50 and chute 51 are directed into each element in turn; when each is filled, the lid 44 is closed with the movement of the chains 20 by striking the pins 46. Water flows continuously in counter-current through the moving elements 34 in which the cane chips are agitated by the intermittent blasts of compressed air from pipes 31. The elements, when raised out of the tank, allow water to drain from the exhausted chips which are then discharged into hopper 53 as the lid 44 pivots open under gravity. The hopper feeds a screw conveyor 54 for removal of the exhausted chips. Movement of the jacks 61, 62 permits variation in the angle of the tank and so variation in the rate of flow of water through the tank.

IMPROVED DISTILLATION EQUIPMENT

FERMENTATION AND BYPRODUCTS INDUSTRIES



Ancillary industries :
Yeast and glucose manufacture

Planning
Projects and Engineering
Construction
Erection
Initial operation

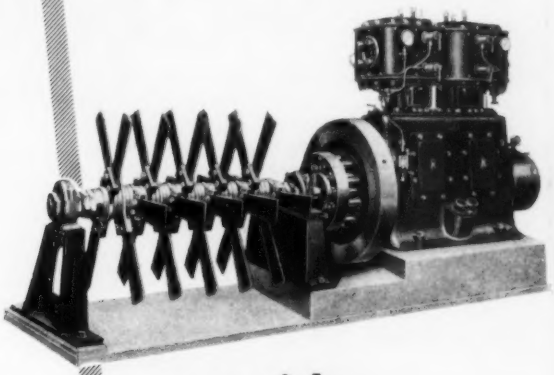
SPEICHIM

Société pour l'Equipement des Industries Chimiques

14 rue la Boétie

PARIS 8 ème FRANCE

PARKER Steam Engines



provide economical power for the Sugar Industry

In factories and refineries throughout the world PARKER steam engines are providing reliable power from process steam at negligible cost. Simple and efficient in design, Parker engines require little maintenance and can be operated by unskilled labour Unlike turbines Parker engines can be direct coupled without the use of costly reduction gearing and variable speed over wide limits can be obtained without complicated control equipment.

Built in sizes from 10 *to* 1,000 *b.h.p. PARKER engines are all constructed to give long life with top economy under the most severe operating conditions.*

Write now for full specifications and applications to:

ASHWORTH & PARKER LTD

RIVERSIDE WORKS · BURY · LANCS.

I.S.J. BINDING CASES

Fixed in an Instant

Practical and Durable

Price: 21s. 6d.
or U.S. $3·00
per annual binding
(including packing and postage)

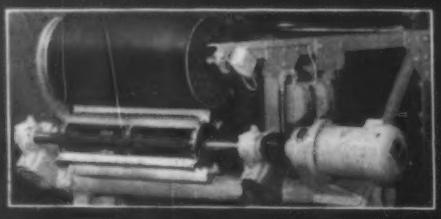
Bind your loose issues of the *I.S.J.* month by month as received. In this case they will open flat to any page. Green covers, gold lettering "*International Sugar Journal*" and the year if desired.

Please state in your order whether the year is to be included.

THE INTERNATIONAL SUGAR JOURNAL, LTD.
Central Chambers, The Broadway, London, W.5. (England)

The Famous Kez - Strip Conveyor Belt Brush

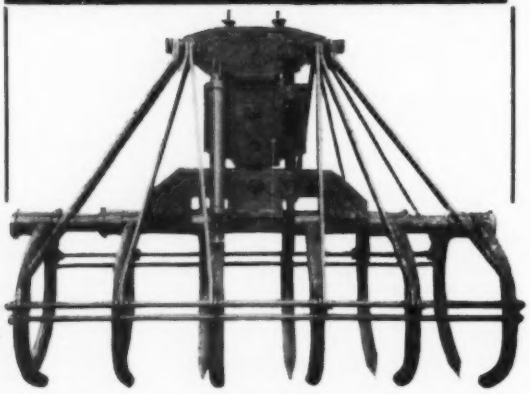
Now -
complete in combination
with our K·A·M UNIT



Showing the Unit in position ready for action. Micro-adjustable. Flameproof. Anti-static features can be incorporated. Little, if any, guarding required.

INDUSTRIAL DIVISION
THE Kleen-e-ze BRUSH CO. LTD
83 BEVAN LANE, HANHAM, BRISTOL

MECHANICAL GRABS



This grapple is specially designed for handling sugar canes. It is of the twin-rope, self dumping type, but can be made to operate from single or multiple rope cranes. Send for full details.

JOSEPH WESTWOOD & CO. LTD.

Contractors to H.M. Government Departments, Crown Agents for the Colonies, British Railways (British Transport Commission), etc. etc., Bridge and Constructional Engineers, Manufacturers of Mechanical Grabs, Pressed Steel Troughing and Sheet Metal Equipment, Steel Stock Holders.

Napier Yard, Millwall, London, E.14. EASt 1043
Cables : Westwood, London
Grams : Westwood, Easphone, London

WESTWOODS

TRADE NOTICES

Statements published under this heading are based on information supplied by the firm or individual concerned. Literature can generally be obtained on request from the address given.

Automatic pipette for beet pol determination. Reyers & Zoon N.V., Omval 20, Amsterdam 6, Holland.

An automatic pipette, in use in all but one of the sugar factories in Holland, supplies accurately weighed amounts of basic lead acetate to beakers for digestion of the beet brei sample. The solution is supplied from a reservoir by way of a constant-level tank and magnetic valve, and feeds into a stainless steel beaker which is on one arm of a sensitive balance at the other end of which is a pan. The unweighed brei sample is placed on this pan and the beaker placed in position. This operates a micro-switch which activates the main switch for releasing the magnetic valve. By operating the main switch, the lead acetate flows into the beaker until its weight reaches 6·835 times that of the brei sample (i.e. a ratio of 177·7 g : 26 g). This proportion may be checked independently and the beaker tare adjusted within $\pm$ 3 g in steps of 120 mg. Operation is rapid and simple and provides an accuracy of 0·12% sugar over 50 weighings compared with 0·14% for 50 comparable manual weighings.

* * *

Bin level indicator. Magco Ltd., Lake Works, Porchester, Hants.

The indicator comprises a flexible diaphragm mounted on the wall of a silo or bin, movement of which operates a micro-switch connected to a visible or audible signal. Use of several indicators along the height of the wall indicates the state of "fill" and top and bottom indicators can be used as limit switches for automatic control. The units may be suspended from the top of the bin, which avoids the necessity of cutting holes, prevents false readings due to build-up on the walls, and permits quick and easy adjustment of height for change of conditions.

* * *

The Russell mill. Russell Constructions Ltd., Russell House, Adelphi, London W.C.2.

In this new design of pulverizer, a shaft carrying a series of paddles rotates at about 5000 r.p.m. inside a hollow steel cylinder the inside serrated surface of which is $\frac{1}{16}$–$\frac{1}{8}$ in from the periphery of the paddles. The paddle blade tips are at $2\frac{3}{4}$-inch intervals, and it is into the space between that the particles to be processed are carried in an airstream generated by a shaft-mounted blower into which the particles are fed. Particles entering this space are caught by the fast on-coming paddle and propelled outwards again, colliding with incoming particles to cause mutual disintegration. The airborne material spirals up the interior of the cylinder until it is ejected by an expeller fan. The unit is powered by a 15–20 h.p. motor and will reduce 400–600 lb of sugar per hour to a particle size less than 50 microns (through 300 mesh sieve).

Level control systems. Firth Cleveland Instruments Ltd., Treforest, Glamorgan, Wales.

The conductivity probe type of control system is based on the completion of a circuit by a conducting liquid when it reaches the probe. The associated amplifier unit incorporates a control relay and lamp indicators of the liquid level. The probe unit mounting withstands tank pressures up to 500 p.s.i. and the probe may be constructed of a variety of materials to withstand corrosion.

The vibrating probe type of control withstands up to 250 p.s.i. tank pressure and can operate with non-conducting liquids. The probe comprises a rod extending into the tank and vibrated by an isolated magnet and coil assembly. When the rod is in contact with a liquid the vibration ceases and thus actuates a control relay. No interference is caused by extraneous magnetic or electric fields and the unit operates from —40 to 200°C.

* * *

pH by Pye. W. G. Pye & Co. Ltd., Granta Works, Cambridge.

The latest laboratory pH meter by Pye is the "Dynacap" instrument which attains almost perfect linearity, stability and accuracy by using a capacitor modulator input stage. It provides the basic ranges of 0–10 and 4–14 pH but also seven expanded ranges of 0–2, 2–4, 4–6, 6–8, 8–10, and 12–14 pH, where discernability is as high as 0·004 pH units. Both manual and automatic temperature compensation are provided covering the range 0–100°C.

The Model "H" Industrial pH Amplifier has fully automatic temperature compensation and virtual independence from normal supply voltage variations. It has exceptional zero stability, and is supplied with a standard range of 2–12 pH although other ranges can be supplied if required. The pH is indicated on an 8 in panel meter, and the amplifier can operate remote indicators, recorders, automatic controllers and alarm systems.

* * *

Torque-flow pump. George Scott & Son (London) Ltd., Leven, Fife, Scotland.

Capable of handling a wide variety of slurries of high solids content without clogging, this pump is of simple construction and requires a minimum of maintenance because of the complete absence of close running clearance between suction and discharge. A recessed impeller, located completely out of the flow pattern imparts a swirling action to the material in the suction line. Particles and solids are drawn into the vortex of the swirling liquid and are discharged with a centrifugal sweep from the open chamber into the discharge pipe which forms a

continuous passage from the inlet flange. The solids seldom touch the impeller so that the pump will handle abrasive fluids with greatly reduced wear. In addition crystals in suspension are not damaged by striking moving parts in their travel through the pump.

* * *

Photoelectric microptic polarimeter. Hilger & Watts Ltd., 98 St. Pancras' Way, Camden Road, London N.W.1.

In the Model M 511 photoelectric microptic polarimeter the optical scale is read visually with a microscope, but a photoelectric setting with an accuracy of 0·005° over 90° has been provided on the extinction angle. A precision of ± 0·002 angular degrees can normally be achieved without fatigue or the possibility of faulty judgement. An optical element is used both as a chopper and to provide a double-beam-in-time system. Out-of-balance signals are annulled by manual rotation of the analysing prism. Polarimeter tubes of any length up to 400 cm can be used, and a sodium lamp is supplied for use in saccharimetry for which a sugar scale is engraved on the microptic circle.

* * *

Bulk sugar transport and handling. Tills Engineering Co. Ltd., Kirkby, Liverpool; Alcan Industries Ltd., Banbury, Oxfordshire; Carmichael & Sons Ltd., Worcester.

A fleet of special Carmichael tanker vehicles are used by Tate & Lyle Ltd. to deliver bulk granulated sugar which is discharged pneumatically to customer's storage through the "Teco" system constructed of "Noral 50 SWP" aluminium alloy. The vehicle incorporates an air compressor to blow the sugar through 4 in piping into the storage hoppers. One customer who also uses the Teco system for pneumatic conveying of sugar from the main hoppers to subsidiary hoppers has found savings of £4 per ton as a result of the £2 per ton bulk discount from Tate & Lyle and reduced handling costs.

* * *

"Straightline" vibrating feeders. Link-Belt Company, Prudential Plaza, Chicago 1, Ill., U.S.A.

The "Straightline" vibrating feeders, which incorporate a new principle employing two unbalanced shafts driven in opposite directions by individual pancake motors, are described in a 6-page Folder 2770. Two models can be either cable-suspended or floor-mounted, and are available in 30 sizes with capacities up to 1350 tons/hour. Reinforced universal brackets provide for floor, ceiling or combination floor and ceiling mounting. Selection and application data are also given.

PUBLICATIONS RECEIVED.

POCKET pH METER. Cambridge Instrument Co. Ltd., 13 Grosvenor Place, London S.W.1.

A meter weighing less than 3 lb, with a range of 0–14 pH in divisions of 0·2 pH, is described in Supplement A to List 108. Accuracy is to ±0·1 pH and the reference and measuring electrodes are combined in a single concentric unit which is not seriously affected by the presence of sodium ions in the range above 10 pH. The meter is powered by dry cell batteries with a life of about 1000 hours. It can be supplied with a plastic shoulder-strap carrying case which has an extra compartment for the electrode and buffer solutions.

* * *

AUTOMATIC WATER SAMPLER. Elcontrol Ltd., Wilbury Way, Hitchin, Herts.

A new Data Sheet WS describes a fully automatic water sampling unit based on the original work of the Water Pollution Research Laboratory. It can be left on site to collect the samples at any time, at regular, predetermined intervals. The unit contains twelve one-pint sample bottles connected by air-tight seals and rubber tubes to an outlet. Each outlet is connected in turn to a vacuum pump and the rubber tube closed with a magnetic pinch valve. The outlet is connected to the water to be sampled and the valve released when the sample enters the bottle. The unit contains a 15-day clockwork motor and a battery-driven transistorized power-pack operating through micro-switches.

* * *

CAST TOOTH SPROCKETS. Link-Belt Company, Prudential Plaza, Chicago 1, Ill., U.S.A.

Stock sizes of cast tooth sprockets, arm and plate centre, segmental and split-rim, are catalogued in Book 2867 which also refers to traction wheels. Data are provided on types and sizes, and also materials of construction.

* * *

CLARCEL FLO. Dececa-Chemie G.m.b.H., Hannover, Kurt-Schumacherstr. 15, Germany.

Advantages of the "Clarcel Flo" range of Perlite filter aids described in a new leaflet include low density—only 50–60 g/litre; 30–50% lower consumption, uniform precoating, high flow rate, and outstanding clarification.

* * *

SIGHT-FLOW INDICATORS. Brooks Instrument Co. Inc., Hatfield, Pa., U.S.A.

Design Specification sheet DS-820 describes Brooks sight-flow indicators which feature rotatable flanges. Information is also included on construction materials, dimensions, pressure ratings and prices.

* * *

BTL INTERMEDIATE OVEN. Baird & Tatlock Ltd., Freshwater Road, Chadwell Heath, Essex.

Leaflet No. DL 21 illustrates and describes the new oven which is intermediate in size and price between the "Stabilec" and "Wide range" ovens. It has a stainless steel chamber, easily accessible electric heating elements and is controlled by a B.T.L. bimetallic regulator with a maximum temperature variation of 4·5°C at 100°C and 5°C at 200°C, maximum fluctuation being 1·0°C (using definitions of variation and fluctuation given in British Standard 2648).

* * *

McNeil sugar machinery.—As has been reported previously[1], the well-known firm of sugar machinery manufacturers, John McNeil & Co. Ltd. of Glasgow have ceased trading and are now in voluntary liquidation. A. & W. Smith & Co. Ltd. have acquired the Drawings and Patterns and the right to describe themselves as the successors of this old-established company. A. & W. Smith & Co. Ltd., who were themselves established in 1837, became part of the Tate & Lyle Group of Companies in 1953, since when their business has continued to expand.

[1] *I.S.J.*, 1960, **62**, 174.

BREVITIES

Taiwan sugar industry study.—American Factors Associates Ltd., the international sugar consultants, have been retained by the Taiwan Sugar Corporation to make a preliminary study of their sugar cane industry, including field practices, transportation, milling problems and matters affecting organization.

* * *

Hawaii sugar production, 1960[1].—The 1960 season came to a close in Hawaii in December with a production, according to preliminary estimates, of 935,745 short tons, which compares with a final outturn in the previous season of 974,632 tons.

* * *

New beet factory for Argentina[2].—The Provincial Government of Entre Rios in Argentina is to erect a beet sugar factory at Victoria.

* * *

New sugar refinery for Nicaragua[3].—A new sugar refinery to the value of 4,600,000 cordobas (about £230,000) is to be erected at Chichigalpa. A quarter of this sum will come from the Governmental Instituto de Fomento Nacional.

* * *

Bagasse newsprint project in the Dominican Republic.—A paper factory, to be established at Villa Altagracia in the Dominican Republic, will produce newsprint from sugar cane pulp, and will come into operation in 1962.

* * *

Thailand co-operative sugar organization[4].—Representatives from fourteen sugar mills in Thailand have met to establish a cooperative in an attempt to stabilize domestic sugar prices, according to a Press report. The Industry Minister has stated that, because of the low price of sugar, thirty to forty per cent of the planters have given up cane cultivation in preference for other crops.

* * *

World sugar industry expansion.—The Foreign Agricultural Service of the U.S. Department of Agriculture has issued a Foreign Agricultural Circular (Sugar FS 4–60) in which a survey is made of the recent developments in the world sugar industries, particularly in Africa and Asia. It is an objective report which is intended as a collection of information rather than an evaluation.

* * *

Cane wax production ceases in Australia[5].—It is reported that the only factory in Australia manufacturing wax from filter-press mud in Australia closed in October 1960. The wax had been used in the manufacture of floor polish, but the Company concerned announced that rising costs had caused the closure of the factory.

* * *

Danish sugar industry reorganization[6].—A proposal has been made for reorganization of the Danish sugar industry involving the establishment of a 120 million-kroner cooperative which would acquire the assets of the sugar factories, according to Reuter. Other activities of the various companies involved would be allowed to continue separately. If approval is given by the respective companies and the Ministry of Commerce it is intended that half the stocks in the new cooperative will be offered to beet producers, factory workers and other related interests.

* * *

Bagasse paper mill for India[7].—Seshasayee Paper and Boards Ltd., a newly organized Indian Company, is setting up an integrated pulp and paper mill in Madras State. The mill, to cost an estimated £4,500,000, will have an annual capacity of 20,000 long tons of printing and writing papers. Raw material will be local bamboo and bagasse. Parsons & Whittemore Inc. of the U.S.A. will handle the engineering, erection and commissioning of the plant and will purchase most of the machinery and equipment. This firm has a 20% interest in the company's capital stock and the Export-Import Bank is providing the foreign exchange financing. The plant, Madras State's first for paper production, is scheduled to be operating in about two years.

New Roumanian Sugar Factory[8].—A new factory at Ludus has started operations, with a daily capacity of 2000 tons of beet. The equipment of the factory was manufactured partly by Soc. Fives-Lille—Cail and partly in Roumania. A further factory is being built at Bucecea[9].

* * *

Record sugar production in Ecuador[10].—Sugar production in 1959 reached a record level of about 100,000 tons, representing an increase of 14% above the previous year's output.

* * *

Japanese participation in Brazilian sugar industry[11].—Approval is expected of the planned purchase of the sugar factory Central Cea Grande by a Japanese sugar refining company. The Japanese Company has been seeking a sugar cane plantation suitable for the erection of a refinery.

* * *

New sugar factory for Pakistan[12].—Fauji sugar factory, one of the largest and most modern sugar factories in Pakistan, has started work. The factory is situated about 20 miles from Hyderabad in West Pakistan. Its daily production capacity amounts to 150 tons of cane sugar.

* * *

Puerto Rico sugar crop, 1960/61[13].—The U.S. Dept. of Agriculture has estimated the Puerto Rican 1960/61 sugar crop at 1,150,000 short tons, according to a Press Agency report. Although this would represent an increase of 131,000 short tons over the previous season's outturn it is anticipated that it would be insufficient to meet local and mainland quotas as well as providing for an adequate carry-over.

* * *

New sugar factory for Bolivia[14].—Late in October 1960 the Bolivian Senate submitted a bill to the Government providing for the erection of a new sugar factory at Bermejo in the Department of Tarija. The factory is to produce 6000 tons of sugar during a campaign of 75 days and this capacity is to be increased later to 10,000 tons. The bill authorizes the Government to contract credit to the value of 3 million U.S. dollars for the purchase of the necessary machinery and equipment. The factory is to be built and put into operation by the Corporación Boliviana de Fomento.

* * *

Tanganyika sugar project[15].—The Kilombero Sugar Company was established at Dar-es-Salaam in May 1960 as the start of a project which will plant 2000 acres with sugar cane in its first phase. A sugar factory with an annual production capacity of 20,000 tons is to be erected and the first sugar cane is expected to be ready for processing in June 1962. The factory is to start operations then while full capacity is to be reached in June 1963. During the second phase a further 1750 acres are to be planted to cane while the factory capacity is to be reach 30,000 tons of sugar per year in 1966.

---

[1] C. Czarnikow Ltd., *Sugar Review*, 1961, (490), 18.
[2] *Fortnightly Review*, (Bank of London & S. America Ltd.), 1960, **25**, 1478.
[3] F. O. Licht, *International Sugar Report*, 1960, **92**, (Supp. 22), 285.
[4] C. Czarnikow Ltd., *Sugar Review*, 1960, (483), 199.
[5] *S. African Sugar J.*, 1960, **44**, 1047.
[6] C. Czarnikow Ltd., *Sugar Review*, 1960, (488), 221.
[7] *Foreign Trade*, 1960, **114**, (12), 34–35.
[8] *Zeitsch. Zuckerind*, 1960, **85**, 552.
[9] *Sugar y Azúcar*, 1960, **55**, (10), 43.
[10] *Fortnightly Review* (Bank of London & S. America Ltd.), 1960, **25**, 1371.
[11] F. O. Licht, *International Sugar Report*, 1960, **92**, (11), 108.
[12] F. O. Licht, *International Sugar Report*, 1960, **92**, (Supp. 22), 288.
[13] C. Czarnikow Ltd., *Sugar Review*, 1960, (485), 208.
[14] F. O. Licht, *International Sugar Report*, 1960, **92**, (Supp. 22), 285.
[15] F. O. Licht, *International Sugar Report*, 1960,**92**, (Supp. 22), 287.

BREVITIES

St. Kitts (Basse Terre) Sugar Factory Ltd., 1960 report.—Crop started on the 3rd February and ran until 12th September, with an outturn of 50,179 tons of sugar from 437,594 tons of cane ground. Very favourable weather was experienced throughout the crop. Automation in the factory and mechanization of cane loading and transport are being advanced, while the bulk sugar installation has been brought into operation.

* * *

Italian sugar factories for Yugoslavia[1].—Contracts for four new factories—in Sremska Mitrovica, Kovin, Pec and Senta—have been awarded to Ansaldo San Giorgio and Nuove Reggiane of Italy. Two of the factories will be of 2000 tons daily slicing capacity and the others of 1500 tons. In addition the existing factory at Zupanja is to be enlarged from 1500 to 3000 tons daily capacity.

* * *

Polish sugar industry expansion[2].—During the period 1961-65 all Polish sugar factories in the Warsaw, Lublin and Rzeszow districts are to be modernized. In addition two large new sugar factories are to be built, one at Werbkowice in the Hrubieszow district and the other, to be erected in 1962, in the Bialystok district of Eastern Poland.

* * *

South Africa—Swaziland sugar production agreement[3].—An agreement was signed in Durban on the 25th October 1960 between the South African Sugar Association and Swaziland sugar producers. Under the Agreement, Swaziland will produce a maximum of 80,000 tons of sugar a season, the marketing of which will be integrated with that of the South African industry.

Stock Exchange Quotations

CLOSING MIDDLE

London Stocks (*at 17th January*, 1961)	
Anglo-Ceylon (5s)	13/1½
Antigua Sugar Factory (£1)	10/–
Booker Bros. (10s)	29/3
British Sugar Corp. Ltd. (£1)	24/–
Caroni Ord. (2s)	4/1½
Caroni 6% Cum. Pref. (£1)	16/–
Distillers Co. Ltd. (10s units)	31/7½
Gledhow Chaka's Kraal (£1)	42/6
Hulett & Sons (£1)	61/–
Jamaica Sugar Estates Ltd. (5s units)	4/1½
Leach's Argentine (10s units)	23/6
Manbré & Garton Ltd. (10s)	61/3
Reynolds Bros. (£1)	41/3
St. Kitts (London) Ltd. (£1)	20/3
Ste. Madeleine (Ord.) (£1)	27/–
Sena Sugar Estates Ltd. (10s)	15/3
Tate & Lyle Ltd. (£1)	50/6
Tate & Lyle Investments Ltd. (5s)	11/9
Trinidad Sugar (5s stock units)	40/3
United Molasses (10s stock units)	39/3
West Indies Sugar Co. Ltd. (£1)	19/9

CLOSING MIDDLE

New York Stocks (*at 16th January*, 1961)	$
American Crystal ($10)	42
Amer. Sugar Ref. Co. ($100)	30⅞
Central Aguirre ($5)	23¼
Cuban American ($10)	18⅝
Great Western Sugar Co.	30⅜
South P.R. Sugar Co.	16
United Fruit Co.	19

Philippine sugar crop, 1959/60[4].—The Philippine Sugar Association reports that a total of 1,528,834 short tons (1,365,030 long tons) was bagged in the 1959/60 crop.

* * *

Ghana sugar developments[5].—A £G 3,500,000 sugar industry is to be set up at Komenda midway between Cape Coast and Takoradi. Eight thousand acres of land have been acquired for the cultivation of sugar cane which will be processed locally. It is hoped that the first Ghana-made sugar will be on sale by 1963.

* * *

South African sugar price rise[6].—On the 21st November 1960 the price of all sugars sold by the sugar industry in South Africa was increased with Government sanction by £4. 3s. 4d. per ton or ¼d. per lb, the full amount accruing to the industry. This is the first increase since May 1952 and represents about 5d. per month extra for Europeans and 3½d. per month extra for non-Europeans.

* * *

Haiti sugar production[7].—Haiti's two sugar mills, which had not produced sugar for export for three years, produced a total of 65,754 short tons of sugar and 4,395,385 gallons of molasses. A windfall profit arose as a result of reallocation of the cancelled Cuban quota in the U.S. market where the Haiti sugar quota was raised from 7014 to 9105 short tons and a non-quota purchase authorization for 26,567 short tons was made giving a total of 35,672 short tons.

* * *

Sugar plans for Nyasaland[8].—The Nyasaland Government has engaged a sugar production expert to advise on the agronomic aspects of growing sugar cane in the Lower River area. It will be recalled that the "Jack" Report, published in 1959, reported that sugar cane appeared to offer the best prospect of economic return in this area (with cocoa a more distant possibility). A team of Dutch agricultural economists also then recommended a £5 million polder scheme for this area to produce sugar cane and other crops.

* * *

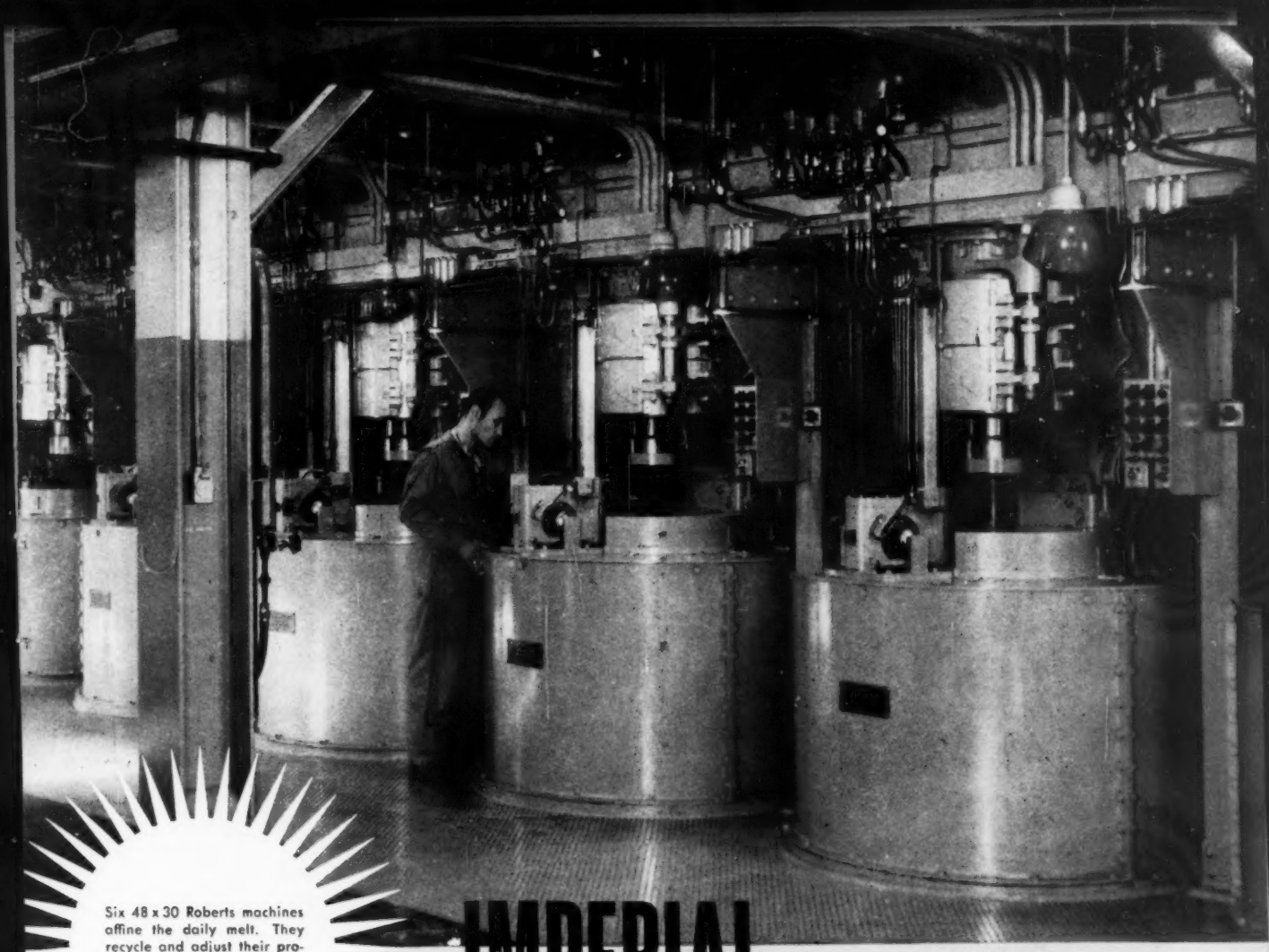
Mauritius sugar crop 1960/61[9].—The last factory finished crushing on the 3rd December 1960. According to a preliminary compilation, the 1960 crop amounted to 235,578 metric tons, but this figure is subject to adjustment when final shipping weights become known. On the basis of yield of sugar per acre, the 1960 output shows a drop of about 61% by reference to the average yield of the three normal years; the drop in 1945—until 1960 the year during which the crop was affected by the worst cyclones which had ever visited Mautitius—was 49%.

* * *

Sugar production in Southern Rhodesia[10].—It has been estimated that sugar production in 1960 may total some 30,000 tons of which 9000 tons is expected from Chirundu and 21,000 tons from the Triangle Estate. It seems likely that the Federation may become self-sufficient in sugar production by 1962 because of development at Chirundu and in the Lundi low veld, and the establishment of machinery to control production and establish orderly marketing has been advocated. It is understood that the Federation is to ask for a sugar export quota and this will be discussed shortly with the U.K. Board of Trade.

---

[1] *Sugar y Azúcar*, 1960, **55**, (10), 10.
[2] F. O. Licht, *International Sugar Report*, 1960, **92**, (Supp. 20), 247.
[3] *S. African Sugar J.*, 1960, **44**, 955.
[4] *Willett & Gray*, 1960, **84**, 531.
[5] *Overseas Review* (Barclays D.C.O.), December 1960, 58.
[6] *S. African Sugar J.*, 1960, **44**, 1031.
[7] *Willett & Gray*, 1960, **84**, 472.
[8] *Overseas Review* (Barclays D.C.O.), December 1960, 32.
[9] *Mauritius Sugar News Bulletin*, December 1960.
[10] *Overseas Review* (Barclays D.C.O.), December 1960, 26.



Six 48 x 30 Roberts machines affine the daily melt. They recycle and adjust their production rate automatically in response to signals from other stations in the plant.

2944

IMPERIAL *Points the Way to*

New Standards in ECONOMY & EFFICIENCY

With ROBERTS G8 *Centrifugals*

The new affination station and bulk storage facility at SUGAR LAND, TEXAS are typical accomplishments of the **IMPERIAL SUGAR COMPANY.**

The cooperative work of their process and engineering staffs accounts for the splendid results.

We at Western States are gratified that our centrifugals were selected and are happy to report on their successful operation.

THE WESTERN STATES MACHINE COMPANY

HAMILTON, OHIO, U.S.A.

TO KEEP THE LEAD . . . WE THINK AHEAD.

Index to Advertisers

	PAGE
Ashworth & Parker Ltd.	xliii
Blairs Ltd.	Inside Front Cover, xxv
Officine Meccaniche e Fonderie A. Bosco S.p.A.	x
Thomas Broadbent & Sons Ltd.	i
Broussard Machine Company	xlii
Cary Iron Works	xlix
Chambon Ltd.	xii
George Clark & Son (Hull) Ltd.	vi
Clydesdale Chemical Co. Ltd.	xlvii
Cochran & Co. Annan, Ltd.	xxxvi
Cocksedge & Co. Ltd.	v
George Cohen, Sons & Co. Ltd.	xlvii
A. F. Craig & Co. Ltd.	xxiv
Crofts (Engineers) Ltd.	xxx
A/S De danske Sukkerfabrikker	xx
Dorr-Oliver Inc.	Inside Back Cover
Electromagnets Ltd.	ii
English Electric Co. Ltd.	xiii, lii
Escher Wyss Ltd.	vii
Ewart Chainbelt Co. Ltd.	xlvi
Ferguson Perforating & Wire Co.	xlviii
Fisons Pest Control Ltd.	xl
Soc. Fives Lille—Cail	viii
George Fletcher & Co. Ltd.	Outside Back Cover
Fontaine & Co.	xlvi
Goka N.V.	xlii
E. Green & Son Ltd.	xxxiii
Gruendler Crusher & Pulveriser Co.	ix
Hein, Lehmann & Co. A.G.	xxxiv, xxxv
N. A. Helmer	xlvi
Johns-Manville International Corp.	xli
Kingston Industrial Works Ltd.	xvii
Kleen-e-zee Brush Co. Ltd.	xliv
Link-Belt Co.	xiv
E. C. Masson	xlvi
Mirrlees Watson Co. Ltd.	iii, xxxviii
Norit	xxxvii
Paterson Engineering Co. Ltd.	xxxix
Pennine Chainbelt Co. Ltd.	xlii
Logan Perkins Ltd.	li
Pott, Cassels & Williamson Ltd.	xxviii
Ransomes, Sims & Jefferies Ltd.	xxiii
Rapid Magnetic Ltd.	xlviii
Renold Chains Ltd.	xix
Rotameter Mfg. Co. Ltd.	xvi
Sackfilling & Sewing Machine Syndicate Ltd.	iv
Richard Simon & Sons Ltd.	xlix
G. & A. E. Slingsby Ltd.	li
A. & W. Smith & Co. Ltd.	xxvi, xxvii
S.P.E.I. Chim.	xliii
Duncan Stewart & Co. Ltd.	xxxi
Stork-Werkspoor N.V.	xi
Suchar Sales Corporation	xxxii
Sugar Manufacturers' Supply Co. Ltd.	xxix
Technoexport Ltd.	xviii
Watson Laidlaw & Co. Ltd.	xxii
Western States Machine Co.	xlv
Joseph Westwood & Co. Ltd.	xliv
Yorkshire Imperial Metals Ltd.	xv

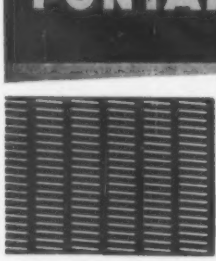
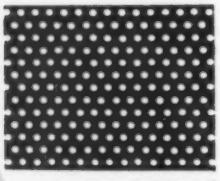
FOR BUYERS' GUIDE SEE JANUARY ISSUE pp. xli-lv

SMALL ADVERTISEMENT RATES

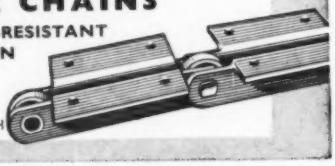
Forty words or under—£1. 10s. 0d. sterling or U.S. $4.00 prepaid. Each additional six words or part thereof—5s. 0d. or U.S. $0.75. Box Numbers—charged as six words.

N. A. HELMER
Member A.S.M.E.
CONSULTING ENGINEER
Representing
The Mirrlees Watson Company Limited, Glasgow, Scotland
Pott, Cassels & Williamson Limited, Motherwell, Scotland
POST OFFICE BOX 54—PLAINFIELD, N.J., U.S.A.

BASIC CALCULATIONS FOR THE CANE SUGAR FACTORY
By J. EISNER
Price : 7s. 6d. ($1·00 U.S.)
Obtainable from the I.S.J. Books Dept.,
Central Chambers, The Broadway, London, W.5

FONTAINE


Serving the Sugar Industry for more than 100 Years
Perforated Sheets of all Types. Speciality: Small Perforations
FONTAINE & CO. GMBH. · AACHEN W.-GERMANY

E. C. MASSON Member A.S.M.E. CONSULTING ENGINEER
CANE SUGAR MILLS & REFINERIES
Engineering & Construction — Improvements & Expansion
FACTORY AUTOMATION
P.O. Box 45-484 MIAMI 45, FLORIDA Telephone:
Cables: NOSSAM U.S.A. Highland 3-3025

EWART CHAINBELT COMPANY LTD. DERBY · ENGLAND
CARRIER CHAINS
IN CORROSION-RESISTANT MALLEABLE IRON
STEEL CHAINS UP TO 140,000 LB. BREAKING STRENGTH


GUARANTEED

PROCESS PLANT

FROM OUR LONDON STOCKS

★ TWIN-ROLL BUFLOVAK DRIER by *Consolidated Products of U.S.A.*, rolls 100 in × 32 in. suitable 100 p.s.i. w.p. Drive through reduction gearing from 5 h.p. 400/3/50 cycles motor. Roll speed approx. 5 r.p.m., take off speed 40 f.p.m. Fitted adjustable scraper knives and aluminium hood. TWO AVAILABLE.

★ TWIN-CYLINDER DRYING MACHINE by *Simon*, 82 in. long × 28 in. dia., complete with gearbox, vee belt drive by 15 h.p. motor and starter, grinding knives, and available spares.

★ OLIVER CONTINUOUS FILTER by *Dorr Oliver*, four rotating discs 6 ft. dia. with timber filter plates in copper trough, driven through worm gear by chain sprocket, with Dry Vacuum Pump, Centrifugal Pump and Filtrate and Wash Water Receivers.

★ NO. 7 SWEETLAND PRESSURE FILTER by *Dorr Oliver*, filter body cast iron construction, 2 ft. 1 in. dia. × 6 ft. 10 in. long internally, twenty mild steel woven wire leaves spaced at 4 in. with sight glass connections. Suitable 50 p.s.i. w.p.

★ UNUSED DEHUMIDIFYING UNIT by *York Shipley*, comprising *York* twin-cylinder 2⅜ in. bore × 2½ in. stroke Freon-12 Compressor, Condenser, Liquid Receiver, thermostatic expansion valve, Evaporator, thermostatically controlled reheat coil, blower and fan. 5 h.p. motor with all electrical equipment, Capacitators, Circuit Breaker, Pressure Switches, etc. Complete in mild steel framework. SEVERAL AVAILABLE.

★ APRON FEEDER by *Fraser & Chalmers*, apron 5 ft. wide × 11 ft. centres. Double beaded apron plates 10 in. wide × ½ in. thick, fitted on heavy roller chains mounted in steel supporting framework. Drive by 12½ h.p. 400/3/50 cycles motor through reduction gear and chain drive to apron sprocket. TWO AVAILABLE.

★ TWO-COMPARTMENT COMPOUND TUBE MILL by *Johnson*, type 3A, tube of welded ½ in. plate construction, 12 ft. long × 3 ft. dia., first compartment fitted stepped liners, second compartment plain liners. Drive from 35 h.p. 400/3/50 cycles motor with starter. Grinding charge available.

★ PORTABLE AGGREGATE DRYING PLANT by *Barber Greene*, comprising two parallel inclined oil fired mild steel rotary driers 20 ft. long × approx 4 ft. 6 in. dia., constructed ⅜ in. mild steel welded plate with internal flights. Single oil burner to each dryer with 4 ft. long brick lined combustion chamber. Chain driven through countershaft by 35 h.p. petrol engine, variable inclination to dryers. Supported on road chassis with pneumatic tyred wheels with towbar.

These are representative items from our wide range of new and reconditioned Plant. Comprehensive stocks also include:

Power Plant, Machine Tools, Hydraulic Plant, Contractors' Plant, Lifting and Mechanical Handling Equipment

May we put you on our mailing list?

GEORGE COHEN

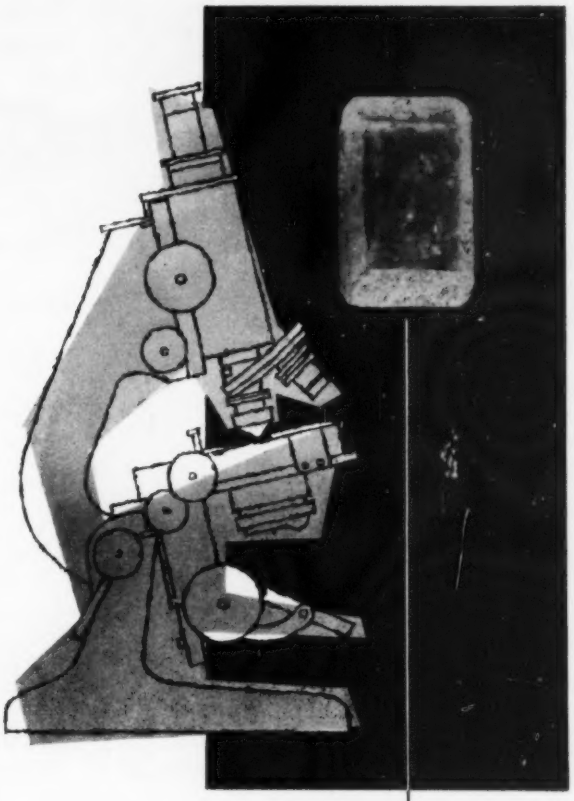
SONS & COMPANY LTD

THE 600 GROUP

ESTABLISHED 1834

LONDON, W.12 Cables: OMNIPLANT TELEX, LONDON

TELEX No. 21288/9



it's

CRYSTAL

CLEAR...

that Actibon Decolourising Carbon must be **your** first choice for economical and efficient colour removal.

Actibon has been specially developed to meet the needs of the Sugar Industry.

ACTIBON

the highly activated Decolourising Carbon

THE CLYDESDALE CHEMICAL CO. LTD.

SALES OFFICE

142 QUEEN STREET · GLASGOW C.1

Phone: CENtral 5247-8 *Grams: "Cactus" Glasgow*

FINEST *to the* **COARSEST**
IN PERFORATED METAL AND WIRE CLOTH

WIRE CLOTH

and FERGUSON
specializes in perfection

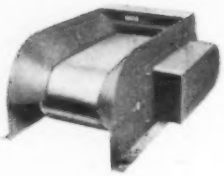
Whatever your filtering needs may be, Ferguson will supply you with a custom tailored filter leaf that will do the job better. Ferguson tubular slit filter leaves last longer, and will outperform ordinary filter leaves in any operation.
Whether you require a fine or a coarse screen, Ferguson has the perforated metal best suited for the job.

FERGUSON PERFORATING & WIRE CO.
130-140 ERNEST STREET, PROVIDENCE 5, RHODE ISLAND
SEND FOR CATALOGUE

Magnetic EXPERIENCE
IN

- SEPARATING
- EXTRACTING
- ELEVATING
- CONVEYING
- FILTERING
- LIFTING
- DETECTING
- HOLDING

60 YEARS



RAPID MAGNETIC LIMITED
LOMBARD STREET, BIRMINGHAM 12

✱ ELECTRO ✱ PERMANENT ✱ ELECTRONIC ✱ ELECTROSTATIC

CONTINUOUS BELT WEIGHER

for weighing whole beets or cossettes

Specially adapted for controlling the speed of cutting mills relative to weight for Continuous Diffusion Plants

Automatic and Sackfilling Weighing Machines

SPECIAL TYPES IN CONSTANT PRODUCTION for

- **RAW SUGAR**
- **REFINED SUGAR**
- **and BEET PULP**

RICHARD SIMON & SONS LTD.

PHOENIX WORKS, BASFORD, NOTTINGHAM

Telephone: 75136-7-8 *Telegrams:* "Balance, Nottingham"

The Australian Sugar Journal

A MONTHLY JOURNAL issued by the AUSTRALIAN SUGAR PRODUCERS ASSOCIATION LTD.

Circulates throughout the sugar-producing districts of Australia.

It has in addition a substantial international subscription list.

Subscription Rates :

One pound (£1) (Australian) per annum.

For advertising rates, write :

G.P.O. Box 608J, Brisbane, Queensland.

CARY SUGAR CANE HARVESTER–CLEANER–LOADER

The Cary combination Harvester-Cleaner-Loader harvesting extremely recumbent 70 ton per acre cane and loading short lengths (15 in. or 22 in. lengths) into special side dump trailers. Capacity under Florida conditions 250-300 tons per day (cut, cleaned and loaded).

Manufactured by

CARY IRON WORKS

OPELOUSAS, LOUISIANA

(Also manufacturers of 3 to 12 ton Carts and Trailers and 4 to 8 ton Field Derricks and Hoists)

Export Division

LOGAN PERKINS LTD.—SUGAR MACHINE RY

P.O. Box 123, Nassau, Bahamas.

"Brasil Açucareiro"

OFFICIAL ORGAN *of the* BRAZILIAN INSTITUTE OF SUGAR & ALCOHOL
(INSTITUTO DO AÇÚCAR E DO ÁLCOOL)

A MONTHLY MAGAZINE containing complete news and specialized contributions on Brazilian and international sugar agriculture and industry.

Annual Subscription:

Brazil ..... Cr.$100.00
Foreign Countries ..... Cr.$150.00
Single Copies ..... Cr. $10.00
Back Copies ..... Cr. $15.00

Remittances must be made in the name of

INSTITUTO DO AÇÚCAR E DO ÁLCOOL
Praça 15 de Novembro, 42,
Rio de Janeiro,
BRASIL.
Caixa Postal 420.

THE SOUTH AFRICAN SUGAR JOURNAL

covering the

Sugar Industries of NATAL, ZULULAND, MOZAMBIQUE and EAST AFRICA

Since 1914

The *South African Sugar Journal* has presented planters and millers in the territories for which it caters with authoritative reviews of developments in all fields of sugar cane technology.

FREE SAMPLE COPY SENT ON REQUEST

Subscription and Advertising Rates available from

THE SOUTH AFRICAN SUGAR JOURNAL
P.O. Box 1209
London Assurance House, Smith Street, Durban, South Africa.
Telephone 25612

SUGAR NEWS

A MONTHLY JOURNAL DEVOTED TO THE INTERESTS OF THE PHILIPPINE SUGAR INDUSTRY

Published by:
THE SUGAR NEWS PRESS INC.

FEATURES

Results of research and experiments in fields and mills, and other important developments in the Philippine sugar industry of interest both to technical men and laymen; sugar production, prices, and market news and statistics; write-ups on other important and allied industries in the Philippines, etc.

SUBSCRIPTION

$7.50 U.S. Currency, per annum, post free *for U.S.A. and its possessions*

$10.00 U.S. Currency, per annum, post free *for other foreign countries*

WRITE FOR A FREE SPECIMEN COPY AND FOR ADVERTISING RATES.

Publishing Office:
417 Dasmariñas, 316 Doña Salud Building, Manila, Philippines.

CUBA SUGAR YEAR BOOK

New Edition (Spanish-English containing **SUGAR CENSUS** corrected to date, informative data and alphabetical index of Sugar Mills, giving situation, ownership, year founded, nationality, characteristics, total employees, yield (%), total cane ground, production and export of sugar, molasses, syrups, alcohol, cane brandy, aguardiente, rum.

Also lands owned and leased, colonos, days grinding, record and maps of rainfall, price of sugar and value of crops. Maps of Cuba showing ports, landings, distances, railways, roads, air communications, telegraph, cable and telephone connexions. Graphs with cane and cane products data. Bonded warehouses, taxes, and legislative measures enacted touching the industry.

Directories with over 3000 names and addresses of official and private organizations, business firms, cane growers (Colonos), department heads, producers, shippers, etc.

Foreign Section: Sugar production in U.S. and other countries (beet and cane). Imports and distribution of sugar and by-products in U.S. World demand and consumption, quotas, distribution, transport, etc.

$5 post paid

Edited by:
CUBA ECONOMICA Y FINANCIERA
POST OFFICE BOX 2549, HAVANA, CUBA
Teleph. M-3148 Lonja 441-442

GILMORE SUGAR MANUALS

MANUAL AZUCARERO DE CUBA
THE CUBA SUGAR MANUAL
(In Spanish). Published Annually—1959 Edition now available.

THE HAWAII SUGAR MANUAL
Published every Third Year—1957 Edition now available.

THE PUERTO RICO SUGAR MANUAL
(including Dominican Republic and Haiti)
Published every other year—1959 Edition now available.

THE LOUISIANA-FLORIDA SUGAR MANUAL
Published every other year—1959 Edition available.

Each $10.00 per copy (post paid)

★ *Detailed Technical Surveys on Agricultural and Manufacturing Practices of the Cane Sugar Industry*

GILMORE PUBLISHING CO., INC.
525 Audubon Bldg., New Orleans 16, Louisiana, U.S.A.

ZEITSCHRIFT FUER DIE ZUCKERINDUSTRIE

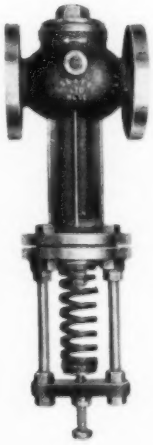
For the last 80 years the *ZEITSCHRIFT FUER DIE ZUCKERINDUSTRIE* (formerly *Die Deutsche Zuckerindustrie*) has been the authoritative German periodical for sugar technology and sugar economics. Each issue contains several original scientific and practical articles written by expert authors. The articles are prefaced by summaries in English and French. In addition, reports on the technical progress of sugar throughout the world and statistical data of world sugar economy are regularly published.

SAMPLE COPIES WILL BE SENT FREE OF CHARGE ON REQUEST

Yearly Subscription Price : DM30.-
(postage included)

PUBLISHED EVERY MONTH

ZEITSCHRIFT FUER DIE ZUCKERINDUSTRIE
Berlin-Nikolassee, Germany
Lueckhoffstr. 16.



REDUCING VALVES

in
GUNMETAL
CAST IRON or
STEEL

Available for
Steam, Water, Air
or Gas

Sizes ½ in. upwards

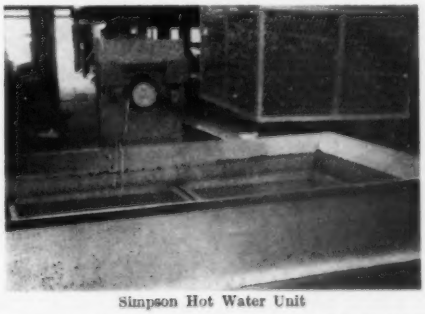
G. & A. E. SLINGSBY LTD.

Phone 20601 (5 lines) — CLEVELAND STREET HULL — *Phone* 20601 (5 lines)

RATOON STUNTING DISEASE CONTROL EQUIPMENT

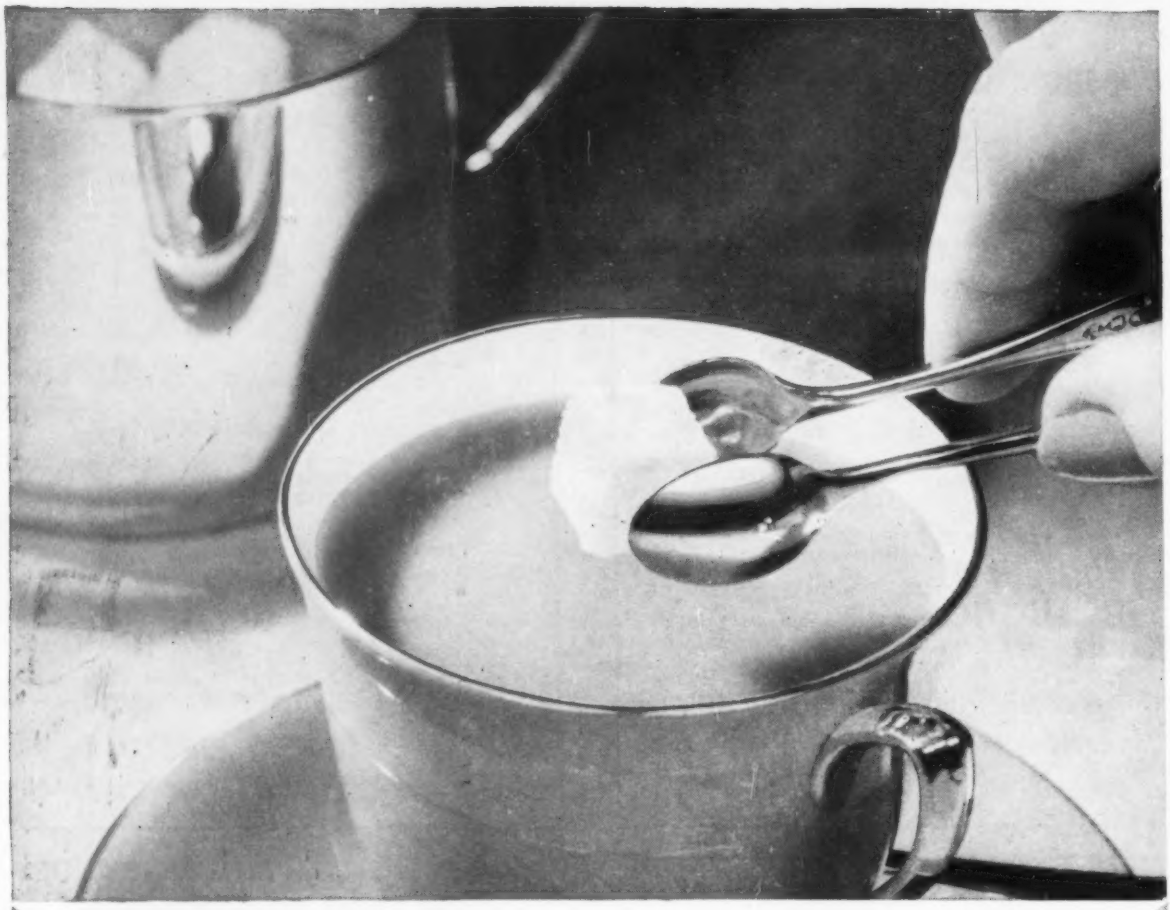
Doherty Hot Air Oven

We offer the Hot Air Type Treating Equipment proven in Louisiana and the Hot Water Equipment proven in Florida, toward the control of this highly contagious sugar cane disease.



Simpson Hot Water Unit

LOGAN PERKINS LIMITED—SUGAR MACHINERY
P.O. Box 123 — Nassau, Bahamas



JUST ONE!

Under a single comprehensive contract, with undivided responsibility, 'ENGLISH ELECTRIC' undertake complete factory electrification.

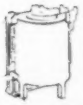
DIESEL ALTERNATOR SETS
STEAM TURBO ALTERNATOR SETS
TRANSFORMERS · SWITCHGEAR
FUSEGEAR · CONTROL GEAR · MOTORS

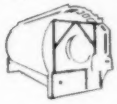
'ENGLISH ELECTRIC'

THE ENGLISH ELECTRIC COMPANY LIMITED, ENGLISH ELECTRIC HOUSE, STRAND, LONDON, W.C.2
Electrical Plant Division, Stafford
WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

S.42

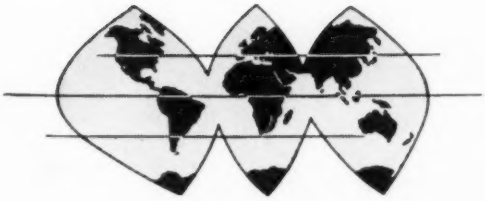
EDFU SUGAR FACTORY, EGYPT, INSTALLS

3  RAPIDORR CLARIFIERS AND

4  OLIVER-CAMPBELL FILTERS

SUPPLIED BY: SANKI ENGINEERING CO. LTD.

CONTRACTOR: SHIN MITSUBISHI HEAVY INDUSTRIES, LTD., JAPAN



Dorr-Oliver's world-wide facilities assure maximum advantages in manufacturing cost, delivery and engineering service.

Dorr-Oliver Companies

Australia Belgium, Canada, France, Germany, Great Britain, India, Italy, Netherlands, United States

Dorr-Oliver Representatives

Argentina, Brazil, British Guiana, Colombia, Costa Rica, Cuba, Hawaii, Jamaica, Japan, Mauritius, Mexico, Philippines, Portugal, Puerto Rico, Reunion, South Africa, Spain, Venezuela

DORR-OLIVER

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

The NEW Liquid Scale

George Fletcher & Co. can now offer their redesigned and patented Automatic Liquid Scale, with these outstanding improvements:

VALVES *are now lever operated, giving twice the original lift on both valves.*

INCREASED CAPACITY *is thereby achieved without loss of accuracy in weighing.*

A SINGLE CONTROLLABLE BUFFER *of the double acting type replaces two non-adjustable buffers. The new buffer can be adjusted to allow for wear and to suit low temperature conditions.*

These machines are available in five sizes to deal with ½, 1, 2, 3½ and 6 tons of liquid per tip respectively, giving a maximum capacity of 200 tons per hour of a liquid of equal viscosity to that of water.

★ SIMPLE YET ROBUST IN DESIGN

★ ACCURATE WHEN CORRECTLY INSTALLED AND MAINTAINED

★ LITTLE MAINTENANCE REQUIRED

FLETCHER AUTOMATIC LIQUID SCALE SERIES 333

(IMPROVED MAXWELL-BOULOGNE SCALE)

GEORGE FLETCHER & CO LTD MASSON WORKS LITCHURCH LANE DERBY ENGLAND

P3416

Printed by JOHN ROBERTS & SONS, Salford, Manchester; and published by the Proprietors, THE INTERNATIONAL SUGAR JOURNAL LTD., at Central Chambers, The Broadway, London, W.5. Entered at the New York Post Office as Second-Class Matter. Registered for transmission by Canadian Magazine Post.

PRINTED IN GREAT BRITAIN.